ENVIRONMENTAL AND ENERGY ECONOMICS: CLIMATE CHANGE MITIGATION AND ADAPTATION, GREEN TRANSITION, CIRCULAR ECONOMY

BOOK OF ABSTRACTS

Editors
Petar Mitić
Slavica Stevanović
Milena Kojić
Aida Hanić

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CONTENT

PREFACE

Dear colleagues,

We are pleased to introduce the Book of Abstracts for the 15th International Scientific Conference *Environmental and Energy Economics: Climate Change Mitigation and Adaptation, Green Transition, Circular Economy*. This Conference is the outcome of a collaboration between the Institute of Economic Sciences, Belgrade, and the COST Programme - COST ACTION 20112 – PROFEEDBACK (Grant Holder Institute: HÉTFA Research Institute, Hungary).

Contained within these pages are studies that address the challenges, implications, and prospects within the domains of environmental and energy policies, energy economics and markets, as well as climate change and environmental economics and finance. The Book encompasses a total of 69 extended abstracts composed by 137 authors hailing from 30 different countries.

The Conference serves as a dynamic platform for the comprehensive exchange of ideas that pertain to new theoretical and empirical research within environmental, energy, and climate economics, as well as policy analysis. The Conference upholds a balanced focus on theoretical and applied research, particularly on policy implications. The Book of Abstracts offers a diverse array of extended abstracts, encompassing topics and discussions based on novel econometric techniques, original and extensive datasets, rigorous study designs, or important policy implications.

We firmly believe that exchanging ideas among researchers and professionals is paramount in gaining insights into this contemporary topic. We trust that the Conference's output will serve as a wellspring of fresh ideas and inspiration for future research within the realm of environmental and energy economics. Moreover, we are confident that the research studies presented within the Book of Abstracts will prove valuable to policymakers, aiding in identifying opportunities to enhance various facets related to climate change mitigation and adaptation, green transition, and circular economy. The Conference also aims to offer a forum for deliberation and evaluation of key issues that interconnect environment, economics, energy, finance, and all aspects of sustainability.

We thank all authors, reviewers, program and organizing committee members, and technical staff for contributing to this Book of Abstracts to fulfill our common goal – publishing high-quality scientific results.

Editors

SUSTAINABILITY AS AN ETHICAL VALUE FOR THE EUROPEAN UNION

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INTRODUCTION

Gradually, sustainability has been increasingly recognized as an ethical value in the policies and actions of the European Union (EU). As global challenges such as climate change and environmental degradation intensify, the EU has been committed to promoting a balanced development model that preserves natural resources and ensures the well-being of present and future generations. This presentation aims to explore the role of sustainability as an ethical value in the EU, examining the conceptual and theoretical underpinnings that underpin this approach and the policy implications stemming from it.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Sustainability is a multidimensional concept that seeks to integrate environmental, social and economic aspects. It is based on the principle of meeting present needs without compromising the ability of future generations to meet their own needs. This approach recognizes the interconnection and interdependence of these dimensions and highlights the importance of making informed and balanced decisions that consider long-term impacts. In this section, the theoretical foundations of sustainability and its integration into EU treaties will be discussed. The conceptualization of sustainability as an ethical value will be analyzed, as well as its role in promoting balanced and sustainable development in economic, social and environmental dimensions.

METHODOLOGY

The present study is based on a comprehensive literature review and desk review of EU policies and treaties related to sustainability. Academic sources, official EU documents and other relevant sources were consulted to examine the theoretical

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and policy framework for sustainability in the EU. The literature review also attempted to cover case studies and analyzes of specific policies implemented by the EU to promote sustainability in key areas such as energy, transport, agriculture and the environment.

RESULTS

The results highlight the incorporation of sustainability into EU treaties and policies, as well as the initiatives and programs implemented to promote sustainability in various areas. Examples include the implementation of the European Green Deal (Green Deal), which sets out an ambitious vision for the transformation of the EU into a sustainable economy, with the aim of achieving climate neutrality by 2050. The Green Deal covers a wide range of areas, from agriculture and industry to mobility and infrastructure, and seeks to promote the transition to more sustainable practices across these sectors. Furthermore, the EU has adopted specific policies and measures, such as regulations and directives, to promote energy efficiency, biodiversity conservation, waste management and sustainable agriculture. These actions reflect the EU's commitment to promoting sustainability as an ethical value through concrete policies.

DISCUSSION / POLICY IMPLICATIONS

In this section, the policy implications and challenges associated with promoting sustainability as an ethical value in the EU will be explored. Opportunities and obstacles for the effective implementation of sustainability policies will be discussed, as well as future perspectives in this field. Although the EU has made significant progress in incorporating sustainability into its policies, there are still challenges to be faced. These challenges include the need to harmonize Member States' national policies to ensure consistent implementation of sustainability goals, overcome resistance from economic sectors that may be affected by the necessary changes, and increase citizen awareness and participation in promoting sustainability.

CONCLUSION

The conclusion will summarize the main points discussed in the study, highlighting the importance of sustainability as an ethical value for the EU. The continued need to promote the integration of sustainability into EU policies and actions in order to achieve sustainable development and ensure the well-being of present and future generations will be reiterated.

KEYWORDS

Sustainability, European Union, Value

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THE NEW EUROPEAN BAUHAUS: A NEW METHODOLOGICAL CHALLENGE FOR EVALUATORS

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INTRODUCTION

The New European Bauhaus is a relatively new concept of designing and constructing buildings pushed by the European Union. It follows three key principles: sustainability, beauty, and inclusiveness. In the case of sustainability and inclusiveness, the evaluation practice is quite common, using various methods and evaluation criteria. On the other hand, beauty and aesthetics are very subjective, making the evaluations more challenging. The three evaluation streams - sustainability, beauty, and inclusiveness - should comply.

LITERATURE REVIEW

Evaluation criteria help the planners know about the merit and significance of a project and its success (Scriven, 2015; Stufflebeam & Zhang, 2017). The set introduced by the OECD and the Development Assistance Committee (DAC)(OECD/DAC, 2021) belongs to the standard evaluation criteria applied.

As the New European Bauhaus also applies inclusiveness and aesthetics as core principles (Bason, Conway, Hill & Mazzucato, 2020), participative evaluation involvement of stakeholders in evaluating targets and effectiveness is essential. Stakeholders must be involved in the development of objectives and evaluation criteria. The fact that aesthetics, in particular, is a subjective matter makes their participation necessary, as part of the criteria will be subjective.

METHODOLOGY

In a case study of the Open Garden in Brno, we show how project implementers evaluate the effectiveness of developing a publicly accessible building from the perspective of the three key principles of the New European Bauhaus. We show the approach to evaluation and indicators used to evaluate sustainability, beauty, and especially inclusiveness of a garden renovation.

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RESULTS

Standard evaluation methods can be used to evaluate each critical aspect of the New European Bauhaus. However, the projects under this concept are always specific and include a strong stakeholder participation component. Thus, it is necessary to apply evaluation criteria specific to the project and respect the issues stakeholders raise.

DISCUSSION

While sustainability criteria and evaluations are already widespread and commonly used, the NEB brings new challenges. The sustainability evaluation must be carried out in the context of other criteria related to aesthetics and inclusion. The evaluators must be prepared for the fact that finding consent on projects' objectives and definitions of evaluation criteria will be a time-consuming process. Thus, the evaluators should participate in the whole policy cycle to evaluate the New European Bauhaus operations profoundly.

CONCLUSION

A participatory approach must be applied to prepare evaluation criteria within the New European Bauhaus construction projects. Not only is inclusiveness one of the critical elements, but aesthetics is so subjective that meaningful evaluation is possible only in close collaboration with stakeholders.

KEYWORDS

The New European Bauhaus, Sustainability, Aesthetic, Inclusiveness

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SUSTAINABILITY CRITERIA IN PROJECT EVALUATIONS: EMBEDDED CONTRADICTIONS

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INTRODUCTION

The definition of sustainability is often debated in the social sciences and may vary depending on the context and discipline from which the evaluator begins his or her evaluation journey. In mainstream project evaluation, there is a commonly accepted definition of sustainability as "the extent to which the net benefits of an intervention continue or are likely to continue". According to this perspective, sustainability is perceived through the lens of project interests and could produce unwanted spillover effects, especially if the economic and environmental elements of the criteria contradict.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Within development studies, many definitions of sustainability include social, environmental, and economic aspects. For example, WWF's defines sustainable development as an "improvement in the quality of human life within the carrying capacity of supporting ecosystems". Further on, the Brundtland Commission perceives sustainable development as a sort of transgenerational justice: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The OECD definition of sustainability is much narrow and, therefore, more operational. Choosing one definition over another influences the process of evaluation.

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METHODOLOGY

The authors will use a framing method in their research. Framing aids the understanding of why choice of one definition of sustainability over another can provoke frustrations or losses for those individuals or groups who perceive a particular event, activity, or phenomenon from a completely different angle. By triangulating data from different sources on sustainability criteria (literature review, analysis of documents, official statements of relevant actors, and reports of non-governmental organizations), the authors aim to offer a critical overview of how it has been defined, operationalised, and applied in project evaluations.

RESULTS

As a result of this critical analysis, we identified that researchers ultimately cherry-pick one of the sustainability concepts when conducting their assessments. Consequently, different concepts generate different framings and results in the evaluation process, which can affect not only the program itself but the broader environment of analysed interventions. Ultimately, the abundance of standards on the sustainability criteria can make it difficult to understand/analyse the whole, leading to the need for cherry-picking.

DISCUSSION / POLICY IMPLICATIONS

Public officers and practitioners have to analyse interventions. Given the absence of complete information, evaluations are the best ways to learn about the outcomes and effects of a particular intervention. Evaluations help to advise on the continuance or cancellation of a programme. Although there is a common standard for conducting programme evaluations, each evaluator ultimately has a degree of freedom when choosing the criteria that outlines the frameworks for guiding their evaluation.

CONCLUSION

In this article, we focus on the sustainability criterion and argue that different conceptual choices might lead to different framings and, consequently, dissimilar assessment results in terms of fulfilling the sustainability criterion. Consequently, the sustainability criterion could be a contradiction in terms – making it difficult to guarantee the political sustainability of a programme by ensuring that it is economically sustainable. This contradiction may end up generating negative externalities (i.e., environmental) which are collectively felt by targeted population. However, this problem affects not only one policy itself but also the set of policies

as a whole - in addition to making it impossible to compare evaluations of different programs.

KEYWORDS

Sustainability, Framing, Evaluation, Economy, Environment

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SYSTEMIC EVALUATION OF PUBLIC PROCUREMENT APPLYING TRANSDISCIPLINARY LENS

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INTRODUCTION

Public policies play a vital role in shaping the well-being of societies, economies, and the environment. To ensure positive outcomes, it is essential to adopt a holistic and systems-based perspective during the planning and implementation of these policies. This approach becomes particularly crucial in the complex and dynamic realm of public procurement systems. Decisions and policies within these systems can have far-reaching consequences for communities, nations, and the planet as a whole. Therefore, it is imperative that representatives of public procurement systems serve as exemplary leaders, a plus reason for researchers to focus on systemic evaluation. The study within the Public Procurement System in Romania, specifically at the level of primary and secondary credits coordinators aims to identify opportunities for developing sustainable and environmentally friendly systems and policies, taking into account both intra-systemic (within the Public Procurement System) and inter-systemic (relating to other relevant systems) perspectives and seeks to shed light on the intricacies and challenges that exist within the system. It aims to explore how the decisions and actions of budget coordinators (mostly political decision-makers) impact sustainability and environmental considerations. Additionally, the study aims to uncover potential areas for improvement and propose recommendations for the development of more sustainable and environmentally friendly policies.

The significance of this research lies in its potential to contribute to the advancement of systems evaluation, not only in Romania but also in a broader context. By highlighting the importance of adopting a holistic and systems-based perspective, the study can serve as a valuable resource for policymakers, decision-makers, and practitioners involved in the implementation of the public agenda.

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Ultimately, the findings of this research endeavor can pave the way for more effective and responsible decision-making, leading to sustainable outcomes that benefit all.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The study conducted a comprehensive literature review using keyword searches in academic databases such as SAGE, Web of Science, and JSTOR where the terms „system" and „evaluation" (Jackson et al., 2020; Patton, 2019) appears together, using web scraping techniques in economic, political, and social sciences. The analysis revealed a scarcity of research that examines the connections between political science, economics, public administration (including public procurement (Bovis, 2005; Caranta & Gomes, 2021)), systemic evaluation (Atkinson et al., 2021; Barbrook-Johnson & Penn, 2021; Bustamante et al., 2021), and sustainability (Allen et al., 2021; Andhov et al., 2017) when seen through the transdisciplinary (Forbat, 2020; LaVelle & Dighe, 2020; Rigolot, 2020) lens.

Furthermore, the study found a lack of recent studies applying systemic, transdisciplinary evaluation approaches in European and Romanian publications. These gaps highlight the need for further research in this underexplored niche.

METHODOLOGY

The research employed a mixed-methods approach, combining qualitative and quantitative instruments. Data collection spanned from November 2021 to May 2023 and involved various stakeholders such as actors from the Central and Local Public Administration, political decision-makers, Romanian and European evaluators, and representatives of the business environment. Questionnaires, semi-structured interviews, and document analysis were used to gather primary and secondary data. The data were then synthesized, cleaned, and analyzed in comparative analysis, against criteria like systemic sustainability, transparency, resilience, and adaptability, using software applications such as SPSS, Vensim, and ChatGPT 4.

RESULTS

The research outcomes affirmed the formulated research hypotheses. It revealed that public policies and their evaluation in Romania are often conducted in a fragmented manner (Sanchez-Planelles et al., 2022), contrary to the claim of a systemic vision. Public procurement emerged as a pivotal lever (Creamer, 2021) within public systems (Kominis et al., 2022), influencing and being influenced by

society, politicians and the natural environment. The study also highlighted the real need to develop the evaluation capacity for the Romanian Public Procurement System, emphasizing the importance of internal evaluators in attributing merit and value (Scriven, 1981) to actions and decisions within the system.

DISCUSSION / POLICY IMPLICATIONS

The findings have significant policy implications. They emphasize the necessity of adopting a transdisciplinary approach in systemic evaluation of public policies, particularly in the context of recent crises and the need for sustainable solutions. The research proposes recommendations for developing the evaluation system, including the establishment of evaluation and engagement standards for internal evaluators. Furthermore, the study underscores the potential value of systemic evaluation in supporting decision-making processes and the development of efficient policies that promote sustainability, responsible consumption, and production while avoiding being locked-in by our own actions or inactions.

CONCLUSION

The research study on the systemic evaluation of public procurement in Romania sheds light on the fragmented nature of policy implementation and the importance of a transdisciplinary approach in evaluation. It underscores the need to enhance the evaluation capacity for the Romanian Public Procurement System and highlights the potential of systemic evaluation to inform decision-making processes and foster sustainable policies. The study contributes to the existing literature by addressing a research gap and provides valuable insights for policymakers, evaluators, and researchers in the field.

KEYWORDS

Complexity, Public procurement, Systems, Systemic sustainability, Transdisciplinary evaluation

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SUSTAINABLE PERFORMANCE FRAMEWORK INDEX (SPFI)

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INTRODUCTION

The aim of our research – commissioned by the Blue Planet Foundation and carried out by Hetfa Research Institute – was to elaborate an indicator system that allows measuring the impact of policy decisions on the state of national resources. Using indicators besides GDP (or combined with GDP) that show the improvement or deterioration of production factors - human, social, economic or natural - is important in order to get a clear picture of social or environmental progress. It is possible only if we observe the outputs of economic activity as well as the quality and quantity of fundamentals which are able to underpin the well-being.

LITERATURE REVIEW / THEORETICAL BACKGROUND

To develop the set of indicators, we reviewed the literature on composite indices and the guidances of major international organisations and the sustainable development strategies of selected countries.

METHODOLOGY

Several experts (economists, environmental engineers, environmentalist, impact assessment experts) were involved in the development of the set of the used indicators through interviews and validating workshops. The methodology of the score calculation is based on the recommendations of OECD.

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RESULTS

As a result of our research, we suggest the introduction of a composite index that is capable of functioning as a signaling system. By this mean, areas where there are shortfalls against the objectives can be identified, therefore it enables better targeted policies.

The composite index of Hétfa Research Institute is called “Sustainable Performance Framework Index” (SPFI). It is a flexible, composite macro indicator that can be adapted in various environments. It indicates the improvement or the deterioration of the state of production factors and resources.

SPFI can be aggregated on 3 different levels:

- group composite (e.g. education, biodiversity),
- resource-level composite (human, social, economic, natural)
- overall (total) composite SPFI score.

Therefore, not only the final SPFI score is informative, but the clusters and the groups within them as well. This means that the index can express the overall sustainability level of a society while it enables the assessment of the individual components.

DISCUSSION / POLICY IMPLICATIONS

As a first step, Hétfa calculated the scores of 10 chosen countries. The results in the sub-categories make the trade-offs visible. For instance, in case of Hungary, a substantial progress can be observed between 2010 and 2021 in the area of good governance and infrastructure, while the value of social capital has significantly declined. These results suggests that decision-makers should focus on the improvement of related policies.

CONCLUSION

With necessary care and diligence, SPFI can be used to compare the economic-social performance of countries which are more or less similar in socio-cultural terms. The most important function of this comparison is to make the sustainable performance of a society visible and to underpin the longitudinal examinations.

KEYWORDS

Sustainability, Sustainable development, Composite index, Natural resources

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CLIMATE CHANGED LAWS, BUT HOW CAN LAWS CHANGE THE CLIMATE?

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INTRODUCTION

Sustainable development is becoming a building block in European policies and documents. By contrast, there is still a lack of greater and more comprehensive coherence among the various agents in Europe regarding the perception of environmental problems, resulting in inequalities across EU member states as well as regions.

The current state of knowledge suggests that there are crucial differences between countries and their innovative ecosystems (e.g. environmental awareness, availability of funding opportunities and infrastructure, and trust among stakeholders).

In 2021, the EU made **climate neutrality,** the goal of **zero net emissions by 2050,** legally binding in the EU. It set an interim target of 55% emission reduction by 2030.

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This goal of zero net emissions is enshrined in the climate law. The European Green Deal is the roadmap for the EU to become climate-neutral by 2050.

LITERATURE REVIEW / THEORETICAL BACKGROUND

More than 318 climate cases have been identified across Europe since 1993 that relate to Climate litigation.

The mid-2000s saw a boom in European climate policy and legislation and, subsequently, in litigation. When the first iteration of the EU ETS Directive came into force in 2005 it had a significant impact on the activities of private parties. Litigation spiked in 2008, as the EU ETS was moving into its second phase, with disputes surrounding the interpretation of Directive 2003/87/EC (EU ETS Directive) and the relative expansion of the competencies of the European Commission and Member States in the regulation of greenhouse gases (see Bogojević, 2013).

Since around 2015, European climate litigation has followed the global trend for increasingly complex climate change litigation, with courts from all over Europe seeing a growing number and diversity of climate cases filed (Setzer et al., 2023).
Prior to the passage of the European Climate Law in July 2021, the core of the EU's legislative response to climate change consisted of a series of 'direct decarbonisation' measures, which are further supported through 'facilitating' and 'integrating' measures.

METHODOLOGY

The research will follow the functional method developed by Zweigert & Kötz, following Michaels' approach.

The methodological approach of the present research proposal will be a combination of doctrinal research, functional wide-scope research, and empirical research.

Qualitative doctrinal research will focus on the relevant cases and decisions of the ECJ originating on preliminary rulings from the EU member states, as well as the established rules of national procedural laws applicable in the different Legal Systems, National Courts and other legal sources.

The chosen methodological research will provide a conceptual understanding of the legal framework case and the efficacy and efficiency of the laws, and procedures.

A quantitative approach will also be used to identify the number of cases, the percentage of infractions/ complaints and the number of sanctions, the applied fines.

Since doctrinal legal research is confined within the boundaries of the law itself, mostly grounded in cabinet research, functional research is put in place in order to compensate for what might be considered an overly theoretical approach.

RESULTS

An outline of the » Fit for 55« proposals will also be presented. Recommendations for the levels of governance will be the major output of this work.

KEYWORDS

European Climate law, Green Deal, Environmental Law, EU, EU integration

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THE REFLECTIONS OF GLOBAL CLIMATE CHANGE POLICIES ON EDUCATION: A CROSS NATIONAL COMPARISON OF PISA RESULTS

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INTRODUCTION

Sustainable Development Goals (SDGs) has set forth 17 Goals for a better future for the world population, in which Goal 13 on Climate Action urges the world population to invest in a mutual challenge. In this paper we take Target 13.3 (Improving education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning) as a measure to examine education policies in relation to climate change through using the latest PISA test scores. In particular, we discuss how Target 13.3 is merged into the educational policies through examining PISA data as a standardized test across countries.

LITERATURE REVIEW

Literature on environmental education reveals that there are differences across individuals and countries on students' knowledge and skills on environmental issues. For example, Yılmaz et al. (2004) explores Turkish students' attitudes towards environmental issues while Uitto (2011) focuses on Finnish students, among other studies in various countries (Jenkins and Pell, 2006). Scientific literacy and environmental concerns are explored through PISA (2006) data by providing a general overview by Bybee (2006). Kaya and Elstter (2018) focus on German students' environmental literacy using PISA questionnaire data. In order to contribute to the existing empirical studies, this study will examine 2018 PISA results to explore students' knowledge, skills and attitudes on environmental issues

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across countries, including climate change and enable a data-driven discussion on investment in sustainable development via education.

DATA AND METHODOLOGY

The latest available PISA database (2018) includes questions on students' and schools' concerns in relation to environmental problems and climate change. The paper uses results from the 2018 PISA student and school questionnaires to make inter country comparisons as to whether the students are subjected to a school curriculum policy that is accepting status quo or has insights to promote sustainability for a greener world. We use cluster analysis to classify countries around the world in groups that are similar to one another and different from other countries with regards to the students' degree of concern in relation to environmental problems. The resulting groups of countries will be compared using selected macroeconomic variables such as per capita income, economic growth rate, economic development and educational policies.

RESULTS

Preliminary cluster analysis results reveal that we can group countries according to the students' involvement in environmental issues[3]. The analysis show that there are three country clusters: Countries with low, moderate and high student involvement in environmental problems. Students' environmental sense of purpose[4] significantly differ across these three country clusters where students with high concern for the environmental problems also show high involvement in environmental issues. Student's environmental awareness[5] and students' self-efficiency in environmental understanding[6] does not have a significant variation across the three country groups. Additional analysis further explored school level data[7] where coverage of climate change and global warming in schools' curricula does not differ across the three country groups with varying levels of student involvement in environmental issues, indicating that curricula and student involvement in environmental issues may not be correlated.

[3] Cluster analysis is performed using PISA student questionnaire items: ST222Q01HA, ST222Q03HA, ST222Q04HA, ST222Q09HA
[4] PISA student questionnaire item: ST219Q06HA
[5] PISA student questionnaire item: ST197Q01HA
[6] PISA student questionnaire item: ST196Q02HA
[7] PISA school questionnaire item: SC158Q01HA

DISCUSSION AND POLICY IMPLICATIONS

The paper takes Target 13.3 of SDGs as a measure to examine policies in relation to climate change through using figures from education. In particular, we discuss how Target 13.3 is merged into the educational policies through examining PISA results as a standardized test across countries. The PISA results are examined to explore students' knowledge and skills on climate change and sustainable development.

CONCLUSION

This focus of the paper is to understand the differences in relation to students' and schools' concerns on issues related to climate change and environment across countries. We revealed groups of countries that differ with regards to students' environmental concerns with varying levels of socio economic characteristics and education policies. The results are anticipated to shed light to guide teachers and young students for a better and sustainable future through school-level policies to provide benefit for wider communities.

KEYWORDS

Climate Change, Education, PISA 2018 student and school data, Cluster analysis

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ECONOMICS AND REGULATION OF OBTAINING ENERGY FROM BIOMASS IN THE COUNTRIES OF EUROPEAN UNION AND SERBIA

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INTRODUCTION

Due to the necessary changes related to climate neutrality, the growth of renewable energy sources is inevitable. Growing concerns about greenhouse gas emissions, climate change and advances in biomass production technology have led to an increase in countries' interest in investing in this type of final energy production. In the period until 2026, it is expected that the share of renewable sources will increase by more than 60% compared to 2020. The growth of their share refers primarily to China, India, Europe and the USA, which account for 80% of renewable sources overall capacity expansion (IEA 2021).

THEORETICAL BACKGROUND

Bioenergy plays a significant role in three main sectors: electricity generation, thermal energy and transport. Its most important role is in the production of thermal and transportation energy. In Denmark, Finland and Estonia, almost 15% of electricity is produced from biomass. Both solid biomass and biogas are used for the production of electricity. The average annual growth rate of the bioenergy sector, in the period of 18 years, between 2000 and 2018, was 2%. When considered individually, the liquid biofuels sector had the highest growth rate, at 13%, followed by biogas, at 9% (WBA 2020).

METHODOLOGY

Through a systematic review of scientific and professional literature, statistical analysis, comparative method, public policy analysis, as well as qualitative analysis, the paper aims to provide insight into the economic aspects and regulatory frameworks surrounding energy derived from biomass in the EU and Serbia.

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Examining the current state of biomass energy, the aim is to identify key themes, challenges and opportunities associated with this renewable energy source. In addition, it aims to present the existing regulations governing the production of energy from biomass and explore potential areas for improvement.

RESULTS

Since 2005, the European Union has had a number of incentives and measures, economic, financial, regulatory and other, for the development of renewable sources, a quarter of which is aimed at biomass. Financial measures were the most common and make up about 60% of measures related to different types of biomass. Thanks to developed national policies, it is expected that the global demand for biofuels will increase by about 28% until 2026. Analysis of policies in Serbia, concerning bioenergy, shows that through regulations concerning aquiring the status of a privileged electricity producer, incentive measures for energy production from renewable sources, as well as Low Carbon Development Strategy and the Action Plan, concrete steps are being taken to reduce emissions of harmful gases by 2030. Also, said policies are a strong basis for the future investments in biomass derived energy. Results presented in the paper show the increase in installed capacity of bioenergy producers through the years, which is the direct consequence of the new incentive measures and policies.

POLICY IMPLICATIONS

In the Republic of Serbia, a legal basis has been established when it comes to the recent energy transition, and therefore the greater use of bioenergy. The area of construction of biopower plants is affected by laws from three different areas, such as those related to the area of planning and construction of facilities - the Law on Planning and Construction, the Law on Spatial Planning of the Republic of Serbia, as well as other by-laws. In the field of energy, it is important to mention the Law on Energy, the Law on Renewable Energy Sources, the Law on Energy Efficiency and Rational Use of Energy.

CONCLUSION

Through the analysis of countries with developed bioenergy production and their national policies, our aim was to determine the course and stage of Serbian bioenergy development. Recognizing the potential of biomass energy, Serbia has taken numerous steps to develop its biomass sector. Therefore, Serbia established regulations and incentives to promote the use of biomass for the production of final energy, and the goal is to achieve National Action Plans through three-year

programs. Current programs contain clear action plans for the introduction of energy-efficient products, processes and technologies, monitoring of the achieved results as well as resources for their implementation. In order to achieve the best possible results, it is necessary to show greater interest in participating in changes, as well as in the production and distribution of electricity and thermal energy from bioplants. It is necessary to devote a greater focus to the development of infrastructure and incentives, as well as advisory bodies to achieve greater efficiency and effectiveness during the construction and use of energy obtained from plants. Steps in this area can also be seen in the construction of a larger number of biogas power plants in Serbia, while the largest amount of biogas power plants in Serbia is concentrated in the area of Vojvodina, 24 out of 28 built, while 73 biogas power plants are concentrated in the area of Vojvodina. Plants with capacity of about 70 MW are under construction. However, there is still room for improvement, especially when it comes to greater involvement of domestic experts in the field of economy and energy.

KEYWORDS

Biomass energy, Sustainable energy, Regulations, Bioenergy, Biofuel

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POTENTIAL OF WIND ENERGY IN BOSNIA AND HERZEGOVINA

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INTRODUCTION

It is globally recognized that the use of renewable energy is of great importance for achieving sustainable development. In Bosnia and Herzegovina, one can find geographical diversity of great importance for the development of wind parks. Bosnia and Herzegovina has natural and geographical potential for the development of wind energy, and some estimates speak of a minimum of 1,000 MW of commercially usable wind power plants. Looking at the legislation and energy trends in the European Union, there is a need in Bosnia and Herzegovina for a stronger step forward in the construction and increase of the capacity of renewable energy sources that are integrated into the electric power system in the European Union.

In this paper, we will show locations in Bosnia and Herzegovina with the highest wind potential, and the way in which wind strength is measured using SODAR and LIDAR. We will explain the principle of operation of large and small (home) wind turbines, as well as the advantages and disadvantages of wind turbines, and provide a conclusion, with the aim of examining the possibility of producing electricity from renewable energy sources, primarily wind energy in Bosnia and Herzegovina.

Wind energy potential is currently being measured at 11 strategically locations throughout Bosnia and Herzegovina using state-of-the-art equipment for wind parks. The wind data were obtained from the Department of Meteorology. Statistical analysis of the data was conducted to determine important monthly and annual statistical parameters and the monthly and annual power density.

LITERATURE REVIEW

The sector of renewable energy sources has been given the task of providing reliable power supply for industry, trade and society as a whole. The motivation is

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not only to replace the dwindling source of fossil fuels, but also to achieve cleaner air and to meet the goals for net zero carbon emissions in globally different time horizons. Both solar and onshore wind energy are limited by geographic factors. In addition, wind energy is generated by airflow, which in turn is influenced by a number of factors, including prevailing climate, weather conditions, underlying surface conditions, topography, and geomorphology (Wolfgang Platzer, 2003).

These factors lead to the randomness, intermittentness and uncontrollability of wind power (Nourani Esfetang & Kazemzadeh, 2018). If wind turbines for the production of wind energy are installed in Bosnia and Herzegovina, as the most developed in the field of renewable energy sources (OIE), it could take the leading position, if the appropriate assumptions are made, which is confirmed by the intensity of interest in the construction of wind power plants.

Some of the potential investors have been measuring and researching wind energy since 2004/2005 at several locations in Bosnia and Herzegovina, and certain requests for permits, consents and connections to the grid have already been sent to the relevant institutions (Pedersen & Waye, 2007). The aim of this paper was to present a specific methodology for documenting windmills, to create a graphic representation using computer graphics, as well as to expand the importance of wind potential in Bosnia and Herzegovina.

METHODOLOGY

This research developed a specific methodology for documenting and displaying the geographic areas where such unique constructions may be found. The techniques used are part of the field of engineering graphics and cartography (Fyhri & Aasvang, 2010). The use of digital photogrammetry is for the purpose of study. Measurements made only using a measuring mast or tower may be classified as banking, and serve in the subsequent phases of the project as a reference for obtaining full or partial financing of the project.

A document classified as bankable is also an expertise for wind conditions. This includes the compilation of measurement data from all sensors, the effect and other analyses, such as: relief analysis, measurement uncertainty analysis, air density analysis, wind force distribution analysis, wind turbine set productivity analysis and more (Mc Cullagh & Nelder, 1989). The expertise includes data that enables the assessment of investments in terms of wind, the choice of turbines, Weitbull's distribution and wind roses in Bosnia and Herzegovina. This information may support decision-making in projects of the results of our research for Bosnia and Herzegovina.

RESULTS

Wind energy, as a sustainable source of energy, has been considered the fastest growing branch of industry in the world in the last ten years. With its strategic documents, the EU initiated the processes of adopting action plans at the national, regional and local levels in order to use all the potential for energy efficient savings. Wind as a source of energy overtook coal and became the second largest energy capacity in the EU, according to the Eurostat report (CROENERGO.EU). Bosnia and Herzegovina is recognized as a country with significant energy resources, both conventional and renewable. In the strategy for the development of electric energy until 2030, wind energy occupies a significant place. The basic strategic goal of Bosnia and Herzegovina is the harmonization of legislation, which is a complex task that implies extensive and essential changes and a comprehensive reform of the energy sector. In order to be effective, legal regulation, that is, energy policy, must satisfy three basic criteria: financial, ecological and safety (Klæboe et al., 2016).

DISCUSSION / POLICY IMPLICATIONS

When dealing with annoyance reactions to transportation noise, the acoustic environment is usually adverse. Strong national and international interests argue that building wind farm is absolutely necessary to achieve renewable targets and degradation of the local environment a necessary evil. Local interests in Bosnia and Herzegovina argue that the establishment of wind farm destroys the local environment. These are questions that are difficult to address scientifically, and are subject to political debate and political differences.

Since the energy mix, topology, attitudes and land use is different in different countries, it is doubtful whether meaningful comparisons of people's reactions can be made from acoustic factors alone. In the ordinal logit model, it is the logarithm of the odds of being highly annoyed that is a function of noise exposure and modifying factors. In practice this means that the values on the modifying factors serve as multipliers and that the same noise exposure level will result in different levels of annoyance depending on site location, and the associated modifying factor values. Since attitudes towards renewables are subject to change, net displacement factors are unlikely to be stable. The results support a straight forward link between attitudes towards renewables as a modifying factor with respect to windmill noise annoyance.

CONCLUSION

If the characteristics of wind in Bosnia and Herzegovina are observed, we may conclude that our country has a good wind potential. This does not mean that the entire area of Bosnia and Herzegovina is extremely suitable for the construction of wind power plants. Measurements of certain characteristics of the wind, using LIDAR, SODAR and anemographs, (speed, direction, frequency), have shown that one area is more suitable for the use of wind energy than the rest of Bosnia and Herzegovina (Eskin et al., 2006).

The goal was to obtain the main technical parameters of the windmill, including the obtained power and momentum. These results will be discussed according to Betz's theory. In this paper, we present solutions such as graphic and cartographic representation by integrating computer design, geodetic processing, photogrammetry, cartography and computer graphics.

KEYWORDS

Wind farms, Environmental impacts, Noise change

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(IM)POSSIBILITIES FOR A JUST GREEN TRANSITION IN BULGARIA

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INTRODUCTION

The energy transition is an enormous global change. The EU aims not only to reduce the greenhouse gas emissions, but also to carry out a fair transition that does not limit development and does not create new social problems. However, the fairness of this process seems to face a risk in regard to the societal capacity to combine demands for justice with economic and technological changes. In the text we will focus on the context in which the green transition is implemented in Bulgaria as it is crucial for the outcomes of the process itself.

LITERATURE REVIEW

In 2015, the ILO adopted Guidelines for a fair transition to environmentally sustainable economies and societies for all (ILO, 2015). Various studies draw attention to the need for interdisciplinary research on the problems of energy transition and the main topics that should address them (McCauley et al., 2019); offer ethical (Jenkins et al., 2018) and theoretical frameworks for conceptualizing the issue of a fair transition; instruments for measuring justice in the energy sector are discussed (Heffron et al., 2015).

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METHODOLOGY

The report is based on the research work implemented in the framework of a project “Public Capacity for A Just Green Transition”, funded by the National Fund “Scientific Research” (contract KP-06 PN55/13). It presents analysis of data obtained through in-depth interviews with different stakeholders and desk research.

RESULTS

The green transition poses particular difficulties for Bulgaria due to its large share of hydrocarbon energy sources. On the other hand, Bulgaria is among the member states that have high levels of energy poverty and income inequalities. Furthermore, during the 1990s, the country experienced deindustrialization and a distinct economic decline, and fears of a new decline are alive. The result is clearly expressed opposing viewpoints and fears that hardly, if ever, find bridges.

DISCUSSION / POLICY IMPLICATIONS

The text argues for the need of meaningful alignment of social and environmental goals based on public capacity to formulate and implement adequate pro-development policies.

CONCLUSION

Achieving a just green transition is a complex task that requires various aspects to be taken into account. The context in which the process occurs is of significant importance for its quality. The results from our study show that there is a high probability that the problem of maintaining justice in the implementation of the green transition will be underestimated, and conflicts will easily arise between the "green" and social goals (justice) of the transition.

KEYWORDS

Fairness, Green transition, Public capacity, Bulgaria

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CHALLENGES OF SUSTAINABLE DEVELOPMENT: INSIGHTS FROM SOCIAL INNOVATIONS CASE STUDIES IN CROATIA

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INTRODUCTION

Social innovations are new ideas (products, services, and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations. In other words, they are innovations that are not only good for society but also enhance society's capacity to act (BEPA 2010).

LITERATURE REVIEW / THEORETICAL BACKGROUND

Croatian experience (Bežovan et al., 2016; Baturina, 2019) shows that social innovation is a neglected topic, a concept that is unknown to professionals and policymakers. The social innovation ecosystem is in the initial phase of development, with some identified cases but underdeveloped institutional recognition and support (Baturina, 2019). The goal of the paper is to explore the potential of social innovation in the field of sustainable development in Croatia.

METHODOLOGY

There are two key research questions: firstly, how do social innovations in the field of sustainable development occur in the Croatian context, and secondly, how do social innovations create effects on sustainable development? The research is based on a qualitative research approach since it deals with an under-researched phenomenon (Moulaert & MacCallum, 2019; Wittmayer et al., 2017) through exploratory multiple case studies (N=5). The analysis strategy was by the research design, based on several key dimensions. Analysis of case studies followed the structure established by Yin (2009).

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RESULTS

Key findings regarding the common features of the cases: organizations demonstrate a strong value base, such as authenticity, transparency, solidarity, and reciprocity in their work; they cooperate with a relatively wide circle of stakeholders from different sectors, such as local authorities, other organizations, educational institutions, and the general public. In their activities, they are guided by the principles of "science in society". Organizations, regardless of the sector they, show preferences for market financing. The impact of organizations on sustainable development is recognized on several levels: through education and awareness raising, influence on policymaking, and influence on the entire industry.

DISCUSSION / POLICY IMPLICATIONS

Backed up with a theoretical framework of transformative social innovation (Haxeltine et al., 2017) and eco-social innovations (Matthies et al., 2019) and based on the results of the research the paper will discuss the challenges of developing social innovation ecosystem in Croatia and promoting new solutions in fields of energy and environment.

CONCLUSION

Social innovation cases showed contributions to different aspects of sustainable development in Croatia. They have value-based motivation characteristics of hybrid organizations. However more supporting policies and enabling environment for social innovations are needed to foster the development of transformative social innovations (Avelino et al., 2019) and further impact the sustainable performance of the country.

KEYWORDS

Social innovations, Sustainable development, Governance, Social impact, Transformative social innovations.

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CAPTURED GREEN INDUSTRIAL POLICY IN HYBRID REGIMES: THE CASE OF HUNGARY

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INTRODUCTION

Climate change has brought environmental protection and green policies to the forefront all over the world. The boundaries of new industrial policies have been considerably extended. At the same, the political system of certain EU members has shifted towards an autocratic direction. Our research question is how green policies are applied in these newly emerging hybrid regimes. We analyse the example of Hungary.

LITERATURE REVIEW / THEORETICAL BACKGROUND

New industrial policies are needed to address sustainable development and transformation towards a low-carbon, resource-efficient economy (Aiginger & Rodrik, 2020; Bulfone, 2022, Altenburg & Assmann, 2017). Bättig and Bernauer (2009) argue that democracies put more effort into climate change mitigation than authoritarian regimes. Povitinka (2018), Bernauer and Koubi (2009) emphasize the importance of low-corruption contexts and other factors.

METHODOLOGY

We support our argument international methodologically with document and scoping literature analysis of and Hungarian sources and interviews with representatives of NGOs, and academic experts. Between November 2022 and February 2023, we prepared seven semi-structured interviews of, 40-80 minutes on Skype, telephone or personally.

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RESULTS

We provide evidence on the capture and instrumentalization of green principles and illustrate some mechanisms of that in detail. The green façade is maintained, yet the implementation and economic policy practices show a totally different, anti-climate and anti-environmentalist attitude and reality. This paper adds a further dimension (environmental sustainability) to the analysis of contemporary hybrid regimes and statist experiments.

DISCUSSION / POLICY IMPLICATIONS

The main mechanisms of neglecting green aspects: 1. No social consultation, no transparency 2. Centralization of decision-making 3. Political capture and/or hollowing out of agencies and regulations; 4. Repression of civil initiatives and organizations; 5. Politicization of communication and overwhelming propaganda. It is very difficult to find policy recommendations and to protect the environment in illiberal systems that compromise green growth and development. One recommendation can be the recourse to the EU law.

CONCLUSION

We do not find any coherent economic policy that would respect sustainability or climate aspects. The strategies aim to fulfil EU requirements and to attract financial resources, whereby the primary motivation is to make private fortunes. The case of Hungary highlights, how green industrial policies are captured in the distorted institutional settings of hybrid regimes more than in established democracies with fully operating checks and balances.

KEYWORDS

Industrial policy, Hybrid regimes, Environmental protection, Hungary

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IMPACT OF TRANSITION TO CIRCULAR ECONOMY IN BOSNIA AND HERZEGOVINA

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INTRODUCTION

The benefits of introducing circular economy principles on the macroeconomic level are numerous. First, the risks that stem from disruptions in global supply chains and fluctuations in prices of resources are reduced. Besides, the adoption of circular economy principles can lead to significant increases in employment and productivity. There are also long-term general benefits, such as the reduction of external effects, reduced pollution and reduced health risks.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Previous studies show that moving towards greater participation in the circular economy could increase the GDP of the European Union by 0.5% by 2030, and employment could increase by 700,000 compared to the baseline scenario (Cambridge Econometrics; Trinomics; ICF; 2018). For Serbia, estimates show that the total increase in employment for the period from 2022 to 2032 ranges between 50 and 110 thousand, while the change in GDP compared to the status quo scenario is between 62.353 and 246.668 million RSD, given in constant prices from 2021 (Mitrović & Jandrić, 2021). Previous research suggested that the CE practices were not very widely implemented among the small and medium size enterprises (SMEs)

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in Bosnia and Herzegovina (Kahriman & Tandir, 2021), although during recent years circular economy has become more recognized – both as a term and as a practice to be used (Džafić & Omerbašić, 2023; Kastrati et al., 2022).

METHODOLOGY

The authors used the prediction model to estimate possible economic gains for the economy and households from implementing circular economy principles (in terms of GDP, employment, fiscal position and economic benefits of CO_2 emission reduction) for Bosnia and Herzegovina. The model relies on econometric research findings on other countries with similar economic structures, estimated investments towards circular economy activities and the economic structure of Bosnia and Hercegovina.

RESULTS

The authors derived several possible scenarios depending on the number of implemented measures and the number of participants included. The economic impact in each scenario is measured through: economic benefits that result from a decrease in the use of resources and energy for those economic sectors that are recognized as the most important for the development of the circular economy; economic benefits for households (increase in their average income due to increased employment and lower expenses for purchasing new products); economic benefits for the economy due to reduction of CO_2 emission, change in GDP, change in employment and change in fiscal revenues.

DISCUSSION / POLICY IMPLICATIONS

The results show that adopting circular economy principles in a larger extern could significantly affect Bosnia and Hercegovina's economy. It could be an important argument for policymakers to speed up this process and devote more resources to its implementation.

CONCLUSION

The first results show the positive effects of the application of circular economy on all analyzed indicators, primarily on GDP, employment, reduction of CO_2, and economic benefits are not negligible even in the minimalist scenario that covers basic measures on the application of the circular economy principle.

KEYWORDS

Circular economy, Bosnia and Hercegovina, Economic growth, Employment

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PROCUREMENT OF INNOVATION AS SMART SPECIALIZATION TOOL ENHANCING THE CE: EVIDENCE FROM GREECE

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INTRODUCTION

The objective of this paper is to investigate how the public sector can effectively intervene to accelerate the adoption of the Circular Economy (CE) while enhancing innovation and growth. It proposes the combination of local development policies, such as the Smart Specialization Strategy (SSS) in the EU, and the utilization of Public Procurement of Innovation (PPI) as an effective policy tool. The paper aims to contribute by intersecting three strands: the circular economy, the smart specialization strategy, and public procurement of innovation. The case of Greece from 2014-2020 is used to support our argument.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The paper discusses the concepts of the CE, SSS and PPI. It explores their potential synergies, highlighting the challenges and resistance to change that each concept faces individually. It argues that the combination of these three concepts can create a conducive framework for mutually reinforcing outcomes, fostering innovation, and driving the transition to a circular economy.

METHODOLOGY

The cornerstone of our analysis is the intersection between the three concepts of interest of this paper. Our approach is that, if we are able to quantify the triple interaction area, we can create a tool that helps generate funding, over and above

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the CE earmarked resources, thus accelerating the transition to the green economy. In order to assess the magnitude of this intersection we used European Structural and Investment Funds (ESIF) data for Greece from 2014-2020.

RESULTS

The analysis of the Greek case demonstrates that coordination between the Smart Specialization Strategy, the CE, and Public Procurement of Innovation can be mutually reinforcing. The availability of technical knowledge, the selection of environmental priorities within the SSS, and the significant public sector involvement in relevant activities create favorable conditions for innovation and the transition to a circular model of production and consumption.

DISCUSSION / POLICY IMPLICATIONS

The paper discusses the potential policy implications of the suggested triple synergy. It emphasizes that the public sector's increased demand for products and services supporting the CE will reduce private sector investment risks and stimulate the creation of new markets. The study suggests that development priorities can provide direction and financial resources for unlocking research potential and fostering entrepreneurial discovery in CE-related innovation.

CONCLUSION

It is argued that the combination of the SSS, the CE, and PPI can effectively address societal challenges, foster innovation, and accelerate the transition to a green economy. Coordinated efforts and the utilization of existing public funding can provide the necessary critical mass to trigger PPI and promote the development of CE-related innovative products and services.

KEYWORDS

Sustainability, Resources, Circular Economy, Policy

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SUPPORT FOR CONGESTION PRICING AMONG BUDAPEST MOTORISTS

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INTRODUCTION

In recent years, the increase in car traffic has become a significant problem for transportation in Budapest. To reduce car traffic, several public transportation developments have been announced for the coming years, but this alone may not be sufficient to reverse the current traffic trends. In order to change Budapest's car traffic in a favorable direction, it may be necessary to internalize the external costs caused by cars through economic incentives.

LITERATURE REVIEW / THEORETICAL BACKGROUND

To gain a deeper understanding of the topic, this study examines the social and environmental costs related to transportation and draws the conclusion that car transportation generates the highest external costs in modern cities overall. Based on research conducted in this field, on average, less than half of these costs are reflected in the price of driving, making it seem self-evident, according to the principle of polluter pays, that this proportion should be increased. After reviewing tax types and fees, it becomes clear that congestion pricing is the most suitable tool for this purpose.

METHODOLOGY

This survey-based research aims to provide an overview of attitudes towards congestion pricing among Budapest drivers. Comprehensive studies have not been conducted on this topic in Hungary, so this research is exploratory in nature, and its results are limited in interpretation due to the lack of validation, representativeness and small sample size. The main objective of this research is to determine the key obstacles to introducing congestion pricing in Budapest and specify important factors influencing the level of support of individuals.

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RESULTS

From analyzing Likert-scale variables and conducting principal component analysis it can be inferred, that openness towards other modes of transport and the support for congestion charges are correlated moderately. Key factors influencing attitudes towards using other modes of transport are the price of public transport, service quality and time of travel. The introduction of congestion pricing was only supported by 25% of respondents, but when proposed with free public transport the support increased by 8,5 percentage points.

DISCUSSION / POLICY IMPLICATIONS

Based on the results, it seems that there is a general openness to using public transportation, and without it, the introduction of congestion pricing, improvements in public transportation quality, worsening personal financial situation, or free fares alone may not have sufficient persuasive power. Territorial factors – mainly the quality of public transportation connections in an area – may also have an effect on the level of support for congestion pricing.

CONCLUSION

While the introduction of congestion pricing proves to be effective in a lot of cities around the world, there still seems to be a lack of understanding about the actual factors determining people's choice of travel. Understanding the factors influencing attitudes towards congestion pricing and other economic tools are crucial for authorities to develop effective regulations and communicate them to the public in a politically acceptable way.

KEYWORDS

Congestion, Pricing, Attitudes, Budapest, Externalities

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EDUCATION FOR SUSTAINABILITY – THE MISSING LINK IN POLICY MAKING FOR THE GREEN TRANSITION

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INTRODUCTION

Most of policy making is stuck in a dominant paradigm way of thinking that struggles with solutions since such proposals are often framed within the same thinking or mindset that created them. However we do not need to stay stuck in such a mindset and a new alternative paradigm is already emerging. Thus one can argue that policy making is the root cause of the current climate change challenges as well as the potential main solution to lead us to the required Green Transition. Education for Sustainability is the missing link.

LITERATURE REVIEW / THEORETICAL BACKGROUND

There is a huge gap in knowledge regarding the critical pedagogies needed for policy makers.

Hili & Pace (2022) have attempted to "personally involve policymakers in their critical education through dialogical encounters aimed at perspective transformational change (p. 36)".

Caruana (2014) has demonstrated the need to invest in leadership, social learning and in the enhancement of the capacity of institutions to be and become innovative cocreators of a new emerging paradigm, arguing that this is a challenge for educators to embrace with passion and urgency.

Hopkins (2009) has demonstrated that the required Green Transition is not a utopic endeavour but a spreading emerging undertaking at a local level that gives a news sense of possibility.

METHODOLOGY

This research is theoretical research to help answer the following questions:

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1. To what extent is our education system preparing policy makers to be ecologically literate?
2. What kind of education will lead us to the required Green Transition?
3. Is Education for Sustainable Development (ESD) – as foreseen in SDG 4.7 – a suitable vehicle to scale up efforts towards the Green Deal and the Green Transition?

It is based on as review of relevant secondary documents and research, using Malta as a case study where necessary, to shed light on the above-mentioned questions.

RESULTS

In spite of the traction that ESD has gained since the UN Decade 2005 – 2014 (International Implementation Scheme, 2005), the approach to ESD has remained fragmented, and still privileges the formal system of education, regardless of the constraints that often emanate from rigid syllabi.

The non formal and informal sectors – particularly as pertaining to policy makers as a target group – have remained at the fringe, under researched, and with no co-ordinated efforts to ensure quality, relevance and accessibility. This jars with the ever-growing understanding that education is central to sustainability.

DISCUSSION / POLICY IMPLICATIONS

New approaches to reach policy makers are needed, as are models and values hierarchies' systems to infuse sustainability across all steps of policy making, including monitoring and evaluation. This needs to be done within an innovation context that understands how government, civil society, academia and industry interact. Indeed active change requires both a top-down approach and a bottom-up approach that seeks to involve different stakeholders, not least civil society, in authentic participatory exercises. The experiments taking place within the Transition Towns framework are indicative of what can be done at a larger scale.
The pedagogic processes taking place at adult, youth and community level - within examples such as the Transition Towns - need to be further researched, understood and systematically captured.

CONCLUSION

This paper argues for an increased role of ESD in the Green Transition. However, the type of ESD required needs to disassociate itself from the dominant paradigm that is at the root cause of the climate challenge and embrace an emerging

paradigm that privileges both empowering policy makers to be change makers as well as the genuine participation of civil society. More research is needed to better capture the pedagogic process that take place within already positive examples of good practice, in order to be able to scale up and scale deep.

KEYWORDS

Education for Sustainable Development, Green Transition, Policy Makers.

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COMMUNITY ELECTRIFICATION AND WOMEN'S AUTONOMY

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INTRODUCTION

A large literature in developing countries finds that household access to electricity improves the overall household welfare (Dinkelman, 2011; Chakravorty et al., 2014; Rathi & Vermaak, 2018; Dang & La, 2019). However, so far, an objective analysis of the impact of reliable electricity on various aspects of women's social autonomy in India has been missing. Accounting for the social autonomy gains from reliable electrification could help target gendered energy policies for sustainable development. In this paper, we examine how reliable community electrification impacts women's autonomy outcomes in India.

LITERATURE REVIEW

Household access to electricity economically empowers women with better employment opportunities and improves women's educational attainment and health (Khandker et al., 2009; Samad & Zhang, 2019; Sedai et al., 2021). But to study women's social autonomy, we need to account for the spillovers generated by household electricity, which we capture by using community electricity as treatment variable. Electrification is hypothesized to improve women's safety

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(Winther et al., 2017), which we show empirically using crime against women data, representing negative autonomy.

METHODOLOGY

We use the latest DID-M estimator proposed by De Chaisemartin and d'Haultfoeuille (2020) using a two-period panel dataset in India. Our treatment variable is the average hours of electricity per day, which acts as an indicator for community electricity, and outcome variables are women's social autonomy outcomes. We show that the results are consistent even with the use of other traditional estimation techniques like two-way fixed effect and generic 'leave-one-out' instrumental variable approach. We use night-time luminosity data as an alternative indicator of community-electricity and show that our results remain intact. Using recent most energy data, we show that our results are relevant contemporaneously.

RESULTS

Results show that with 10 hours of increase in community-electricity, mobility and value of opinion of women increases by 0.44 SD and 0.04 SD. Likehood of contraceptive use, receiving treatment and knowing husband increases by 4%, 1% and 5%. Community-mean age of marriage increases by 0.07 years & number of rapes decreases by 0.43. Findings indicate higher social autonomy for women in areas where average electricity in the community is higher. We identify four possible channels of the impact: employment, education, awareness and safety.

DISCUSSION / POLICY IMPLICATIONS

In India, social and cultural norms play an important role in women empowerment, especially in women's autonomy. All the outcome variables chosen in our study are inextricably linked to one or more social norms. Hence, in the process of finding out the impact of community electrification on women empowerment outcomes, our study underscores the norm-breaking ability of reliable electrification, which can be useful from policy perspectives.

CONCLUSION

This paper studies the impact of electrification and women's autonomy by using a combination of household survey data, administrative data, and satellite data to carry out a comprehensive causal analysis with five robustness checks. We conclude

that reliable community electrification enhances the social autonomy of women, via direct and spillover benefits of electrification.

KEYWORDS

Electrification, Autonomy, Gender, Violence, Externality

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ENVIRONMENTAL CITIZENSHIP – AN INSTRUMENT TO ENHANCE SUSTAINED ENVIRONMENT POLICY THROUGH COMMUNITY GARDENS

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INTRODUCTION

An examination and analysis of environmental policy created through the idea of community garden (CG) initiation among Ethiopian immigrants who settled in urban areas among Project Renewal sites and developed on community needs, social-economic-cultural pillars.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Environmental citizenship and Community Garden are two terms where the first presents the theoretical concept and the second is the outcome. The literature review stemmed from four years of participation in COST Action CA16229.

The EU strategy and European vision, in line with the EU Roadmap 2050, give particular attention to citizen's participation and engagement and therefore to environmental citizenship. It has been an influential concept in economy, policy, philosophy, and education management. The definition of environmental citizenship by ENEC (2018) is used here as the main analysis factor.

METHODOLOGY

The study examines eight CGs located in neighborhoods included in the Israeli Project Renewal (Weinstein, 2010) composed of Ethiopian populations. Methodology stages included several steps: fieldwork research collecting data on the neighborhood history and development, socio-economic information, local municipality services, and community institutions; Interviews with CG coordinators, Ethiopian immigrants, social workers; Physical visits to each CG; List of operational definitions; and a questionnaire.

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RESULTS

The results show positive benefits for both individuals and society due to the way CGs developed (Bell et al., 2016; Agustina et al., 2012). The benefit includes: food production, fostering feelings of self-worth and self-confidence; Civic engagement; The right to the city; Governance structure (Glover, 2005); Biodiversity; Environmental citizenship (Hadjichambis et al., 2020); Agent of change (Filkobski et al., 2016).

DISCUSSION / POLICY IMPLICATIONS

The study's topic integrates three terms: community, garden, and citizenship (Dobson, 2010; Berkowitz, 2005). Community means the social population of the study including aspects of values and norms sense of belonging environmental citizenship; Garden is the open space targeted as the physical place of activity; and citizenship account as democracy theory concept involved politics, rights and duties, social and human capitals, social empowerment and government politics (ENEC. 2018). Environmental citizenship implemented as official policy among ministries and local governments (Eizenberg, 2008), influencing urban policy and financially supported.

CONCLUSION

Environmental citizenship become a sustainable culture in which values, point of views towards the way of life gives central place for sustainability. This culture conservation and preservation of natural resources including social environmental and cultural capitals. Environmental citizenship policy is the key for politicians, decision makers, stakeholders, private and public partners and citizens to strive for better quality of life around the globe.

KEYWORDS

Community gardens, Ethiopian community, Patriarchic VS modernized society, Environmental citizenship, Environmental instrument creating policy

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ENVIRONMENTAL REGULATION OF THE FASHION SUPPLY CHAIN

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INTRODUCTION

The sustainability of global production chains is at the center of discussion in the past few years. One of the most polluting sectors is the fashion industry. Fashion brands often decline responsibility and continue misleading communication. The paper gives an overview about the currently growing legislation climate towards the environmental effect of the fashion industry, in parallel with the actual impact of the fashion industry.

LITERATURE REVIEW / THEORETICAL BACKGROUND

There is a large literature on the fashion industry's greenhouse gas and CO_2 emissions, water consumption, microfiber pollution, textile waste and waste management problems (Niinimäki et al., 2020; Peleg Mizrachi & Tal, 2022). The exponentially increasing consumption of low-cost products and the question of customer responsibility have also been discussed. Experts call for a fundamental change within the industry (Suraci, 2021).

METHODOLOGY

Based on documentary analysis and literature review, the paper describes current civil, supranational and governmental policies aiming to enhance the environmental dimension of sustainability related to the fashion industry.

RESULTS

While there is a growing legislation climate towards the unsustainable practices of the fashion industry and its environmental impact, the paper highlights some problematic areas of sustainability and the under-researched environmental

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impact of the segment. Information bias and overcommunicated issues are also the hotbed of misleading communication and corporate greenwashing, divert governmental policies as well. The paper describes the different levels and targeted areas of regulation.

DISCUSSION / POLICY IMPLICATIONS

Even if the author doubt that global fashion chains can be sustainable, they offer both managerial and policy suggestions to reach the highest level of environmental sustainability within the fashion industry.

CONCLUSION

Being environmental-friendly is a basic element of company-images today among the leading fashion companies and its communication can bring new customers, can build confidence, and raise profit. The over- and underemphasized issues of the environmental aspect of sustainability within the fashion industry also leads to biased governmental legislation. While national and international rules and certificates exist in the fashion industry, their effectiveness is questionable.

KEYWORDS

Fashion industry, Environmental sustainability, Global supply chains, Greenwashing, Legislation

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MACROECONOMIC IMPACTS OF THE "FIT FOR 55" PACKAGE OF PROPOSALS

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INTRODUCTION

The European Commission's "Fit for 55" proposal aims to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels as an intermediate step towards climate neutrality, as part of the European Green Transition. In this context, the EU will review its climate, energy, and transport legislation to align it with the 2030 and 2050 targets. On behalf of the Ministry of Energy, our research aimed to enumerate the macroeconomic impact of the emission reduction proposals.

LITERATURE REVIEW / THEORETICAL BACKGROUND

We use standard macroeconomic modeling techniques to quantify the macroeconomic effects of demand changes, that come from adapting to the "Fit for 55" package.

The model inputs were supplied by the researchers of the REKK, who used their HU-TIMES model (see Mezősi & Rácz (2023) for example).

For our research, we used our in-house developed HÉTFA-CGE model. It is a standard statical computable general equilibrium (CGE) model, that is based on the Input-Output tables of the Hungarian economy. We used it for numerous studies, like Major et al. (2016) and Major & Drucker (2015).

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METHODOLOGY

During the calculations, we calculated two macroeconomic paths. The first is the baseline, where the exogenous variables are standards, i.e., past real values or the most accurate expectations for the future. We then compute the counterfactual path, in which we change, by term shock, the exogenous variables under investigation. We define the effect of the change as the difference between the two trajectories.

RESULTS

The shocked variables are the increased investment needed by the economic sectors and the reduction of energy consumption. We also count on the households spending on home improvements resulting in a change in energy consumption.

The calculated result variables are the GDP, employment on the sector scale, and government revenues.

We find, that the secondary effects of the proposal regarding the GDP are not different than zero. However, the sum of the employment and tax income is overall positive.

On the sectoral level we find, that there is a great heterogeneity amongst the sectors. The biggest beneficiary is the construction sector because these energy efficiency investments entail a large investment demand for that sector. Meanwhile, the industrial sector also sees growth, while the others decline.
As for the household sector, we find, that the investment required outweighs the energy cost savings.

DISCUSSION / POLICY IMPLICATIONS

As for policy implications, we identify the sectors that will benefit or not from the proposal. On one hand, the policymaker receives an increase both in employment and in government revenues. On the other hand, a small but not insignificant shift toward the industrial and construction sector in the economic structure might not be ideal for the long term. One should look into, whether this shift should be compensated.

The significant loss of household welfare also brings significant policy implications. The government has to and should look into, how to get the households to reach the goals set in the Fit for 55 proposal. For example, through direct and indirect subsidies.

CONCLUSION

Summarizing the sectoral impacts in terms of employment, employment growth is mainly in the construction and logistics sectors, At the same time, gross value added (GVA) growth is also mainly concentrated in these sectors, and the increase in GVA is higher than the decrease in the other sectors. In the case of households, the investment they require heavily outweighs the decrease in their energy consumption.

KEYWORDS

Economic transition, Macroeconomic modeling, Green economy

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THE ISLAMIC ECONOMY: PROMOTING SUSTAINABLE DEVELOPMENT GOALS THROUGH JUSTICE, SUSTAINABILITY, TRANSPARENCY, AND SOLIDARITY

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INTRODUCTION

The Islamic Economy is an economic system based on Islamic faith and principles that aligns with the principles of sustainable development and contributes to the construction of a sustainable future. The Sustainable Development Goals (SDGs) are an initiative set by the United Nations consisting of 17 main goals aimed at ending poverty, ending hunger, reducing inequality, combating climate change, and building a sustainable future around the world. The Islamic Economy supports these goals through its emphasis on justice, promoting social equality and fair resource distribution. Additionally, it encourages sustainable resource management, taking into account the temporary nature of human existence and the importance of protecting the environment. The Islamic Economy also promotes transparency and accountability in economic decision-making, preventing corruption and ensuring efficient resource utilization. Lastly, it fosters solidarity and cooperation through practices such as zakat and alms, supporting the poor and reducing poverty. Zakat is a form of almsgiving in Islam, considered a religious obligation and a mandatory charitable contribution. It is a form of worship that

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requires Muslims to donate a certain proportion of their wealth each year to charitable causes, often considered a tax. Alms, on the other hand, refer to money, food, or other material goods donated to people living in poverty, often considered an act of virtue or charity. Almsgiving is a widespread practice in various religions and cultures. The Islamic Economy can play a significant role in achieving the SDGs and advancing sustainable development worldwide.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The Islamic Economy aligns with SDGs through shared values and principles, emphasizing justice, social equality, and reducing income inequalities, contributing to poverty reduction and achieving poverty elimination. (El-Gari, 2018; Ahmed, 2020). Islamic Economy promotes sustainable resource management, environmental protection, and stewardship, supporting SDGs 12 and 13 (El-Ashker & Wilson, 2018; El-Gari, 2020). Transparency and accountability are integral to the Islamic Economy due to its adherence to Islamic teachings. Islamic finance follows ethical practices and discourages non-transparent and risky activities (Belouafi & Ariff, 2019). Islamic Economy promotes transparency, combats corruption, and supports SDG 16 (El-Ashker & Wilson, 2018).

Islamic teachings emphasize solidarity and cooperation through practices like zakat and alms-giving, supporting the poor and reducing poverty (Saeed et al., 2021). Islamic Economy promotes social solidarity, reducing inequalities, and promoting individual well-being, emphasizing business and individual responsibility (Rahman et al., 2020). In conclusion, the literature review highlights the significant role of the Islamic Economy in contributing to the Sustainable Development Goals.

METHODOLOGY

This study employs a qualitative research approach to explore the relationship between the Islamic Economy and the Sustainable Development Goals (SDGs). The research methodology involves a comprehensive review and analysis of existing literature, including academic articles, reports, and relevant publications from reputable sources.

The study begins with a systematic literature review to gather information on the Islamic Economy and its alignment with the principles of sustainable development. Various databases, such as academic journals and online libraries, will be searched using relevant keywords. The literature review will help establish a theoretical background and provide insights into the connections between the Islamic Economy and the SDGs.

RESULTS

There are various relationships and connections between Islamic economics and sustainability goals. Islamic economics encompasses a set of principles and values that support sustainability goals. For example, Islamic economics emphasizes the protection of natural resources. According to Islam, people should use resources without wasting them and should not disturb the balance of nature. Sustainability goals also aim at the sustainable management of natural resources.

The Islamic economy offers an approach that is compatible with sustainability goals by encouraging the sustainable use of resources. In addition, Islamic economics promotes the equitable distribution of wealth. Sustainability goals also aim to reduce income inequality and end poverty. The Islamic economy emphasizes the equitable sharing of resources and the achievement of social justice to support sustainability efforts. In the context of social responsibility, Islamic economics encourages businesses and individuals to fulfil their social responsibilities. According to Islam, economic activities should be carried out not only to make a profit but also to contribute to the well-being of society. This coincides with the goals of sustainability because sustainability requires the fulfilment of social and environmental responsibilities. In terms of a human-centred approach, Islamic economics encourages a human-centred approach. Sustainability goals also aim to meet people's needs and improve their quality of life. The Islamic economy encourages the prioritization of human welfare and the realization of sustainability goals in a way that is compatible with human needs. Islamic economics, in the care of environmental protection, emphasizes the protection of the environment and the sustainable use of natural resources. This is in line with the sustainability goals. Sustainability aims to protect the environment and ensure the balance of ecosystems.

DISCUSSION

Islamic economy shares common goals with sustainability, contributing to social, environmental, and economic progress towards a more sustainable future.

The United Nations' Sustainable Development Goals (SDGs) are 17 global goals aimed at supporting sustainable development by 2030. The Islamic economy aligns with these goals, focusing on poverty reduction through mechanisms like zakat and sadaqah. It also promotes equitable income distribution and social welfare. SDG 16 promotes fair, rule-of-law-based, and transparent institutions, based on principles of justice, transparency, and accountability.

The Islamic economy can contribute to SDG 16 by promoting human rights and a just legal system. SDG 10 aims to reduce income inequalities and ensure equality of opportunity, while SDG 6 focuses on clean water and sanitation. Islamic economics emphasizes water conservation, equitable distribution, and sustainable use of resources. SDG 13 focuses on climate action, promoting environmental protection and sustainable resource management. The Islamic economy can contribute to climate action goals by promoting sustainable energy use, energy efficiency, and reducing dependence on fossil fuels.

CONCLUSION

The Islamic economy and the Sustainable Development Goals (SDGs) share similarities and compatibility. The Islamic economy promotes poverty alleviation and assistance through mechanisms like zakat and sadaqah, which are powerful tools for CSR and SDGs. It focuses on halal food production, fair distribution, and ensuring everyone has access to safe, nutritious, and adequate food. SDG 1 aims to end poverty and create an egalitarian economic structure, while SDG 2 focuses on ensuring everyone has access to safe, nutritious, and adequate food.

The Islamic economy also emphasizes human health and good living conditions, promoting access to health services, patient rights, and ethical values. SDG 3 focuses on maintaining a healthy lifestyle and promoting good well-being, while SDG 4 aims to provide egalitarian and qualified educational opportunities. Finally, SDG 5 aims to achieve gender equality and women's empowerment.

The Islamic economy provides a framework compatible with SDGs to contribute to sustainable development goals and improve people's well-being. It also emphasizes sustainability goals such as social justice, fair resource distribution, environmental protection, and meeting human needs. The Islamic economy can contribute to climate action goals by promoting sustainable energy use, energy efficiency, and reducing dependence on fossil fuels.

KEYWORDS

Islamic Economy, Sustainable Development Goals (SDGs), Sustainability, Transparency, Solidarity

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DETERMINANTS OF LOCAL FOOD CONSUMPTION: PROPOSAL OF A CONCEPTUAL MODEL

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INTRODUCTION

Unsustainable production and consumption are regarded as the main causes of environmental degradation, loss of biodiversity and climate change. According to the UN's findings, 13.3% of world food is lost after harvesting and before reaching the final consumer. Locally sourced food has been recognized as a possible solution towards more sustainable food consumption, due to higher level of resilience and adaptability of short food supply chains (Bakalis et al., 2020; Cappelli & Cini, 2020; González-Azcárate et al., 2021; Benos et al., 2022; Bingham et al., 2022; O'Neill et al., 2022).

LITERATURE REVIEW / THEORETICAL BACKGROUND

Locally produced food positively affects the environment, taking into consideration reduced food miles (Fan et al., 2019; Aprile & Fiorillo, 2023). This study builds upon extant literature on the determinants of sustainable, green, eco-friendly food consumption to propose a comprehensive conceptual framework of the determinants of consumer purchase intentions related to locally sourced food. The Theory of Planned Behavior emerged as the most extensively applied framework to examine consumer behavioral intentions.

METHODOLOGY

Systematic review of literature available in databases ScienceDirect, Emerald, ProQuest, Wiley Online Library has been performed, using search terms "local food", "sustainable food", "behavioral intentions", "Theory of planned behavior".

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The focus has been on papers published in English language in the period between January 2000 and June 2023.

RESULTS

Taking into account motives for local food purchases we propose health consciousness, environmental concern and concern for local economy and community as the antecedents of consumer attitudes towards local food purchases and extend the framework of the direct determinants of consumer purchase intentions by the inclusion of moral norms, perceived value and trust into local food suppliers (Bianchi & Mortimer, 2015; Birch et al., 2018; Giampietri et al., 2018; Konuk, 2018; Dorce et al., 2021; Aprile & Fiorillo; 2023; Kamboj et al., 2023; Parashar et al., 2023; Yang et al., 2023).

DISCUSSION / POLICY IMPLICATIONS

Although the present study, which has focused on the proposal of a conceptual framework, does not provide readily applicable policy implications, an empirical examination of the proposed model would provide evidence-based knowledge on the main antecedents of local food consumption and direct policy-makers to priority areas for behavioral interventions.

CONCLUSION

An examination of the proposed framework would indicate relative importance of the determinants of customer purchase intentions towards local food, whereas the strongest direct predictor of intentions should be prioritized in communication strategies and communication campaigns aimed at promoting local food consumption. Empirical examination of the proposed framework in a developing economy would contribute to the body of knowledge on sustainable food consumption.

KEYWORDS

Local food consumption, Theory of planned behavior, Short food supply chains

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CONTRIBUTION OF BIODEGRADABLE WASTE TREATMENT TO CIRCULAR ECONOMY POLICY

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INTRODUCTION

As a pre requirement for joining the European Union (EU), Republic of Serbia has to comply with the goals of the EU landfill directive and introduce sustainable solutions for diversion of biodegradable waste from landfills. The aim of this paper is to evaluate the contribution of the processes for biodegradable waste in order to fulfill the goals of sustainable waste management.

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LITERATURE REVIEW / THEORETICAL BACKGROUND

There is a long way in a waste management of Serbia from open dumping to being a vital part of a circular economy concept. Adopting EU policy into the national legal system is only the first step in the process of adapting to EU standards. The adequate application and enforcement of regulations at the national and local levels is a component of the EU's environmental protection policy.

METHODOLOGY

In order to implement sustainable waste management and meet the objectives of the landfill directive, it is necessary to introduce the diversion of biodegradable waste from landfills (Stanisavljevic, Levis, & Barlaz, 2018). All results in the material flow analysis (MFA) can be controlled because their basic principle is based on the material balance comparing all inputs, stocks and outputs of a process (Brunner & Rechberger, 2004). The software STAN has been applied for modeled scenario (Stanisavljevic & Brunner, 2014).

RESULTS

In this paper, the scenario for the year 2030 is modeled and MFA was used to evaluate the extent of combining anaerobic digestion and home composting contribution to diversion of biodegradable waste from landfills. Functional unit for the scenario is 3,119,000 tons per year. In the scenario (Figure 1), 10% of biodegradable waste is going to home composting and other biodegradable waste is treated in anaerobic digestion plant. It is calculated that 508,000 tons of compost will be produced annually.

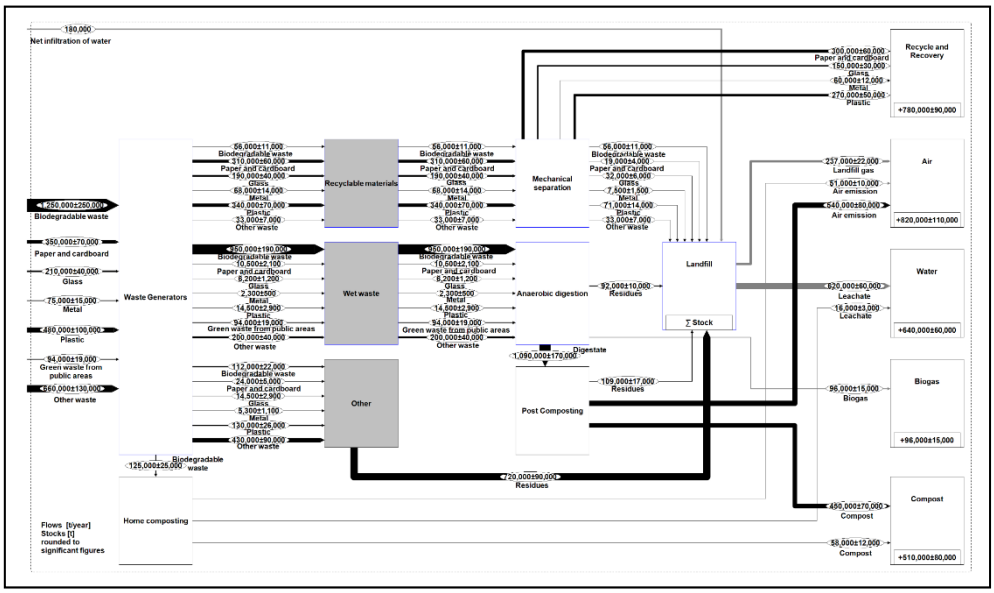

Figure 1: Material flow analysis of modeled scenario

DISCUSSION / POLICY IMPLICATIONS

The modeled scenarios could be used in order to evaluate to what extent different waste management systems can comply with the existing circular economy policies, quantitative goals of the EU directives and in the same time contributes the most waste management goals (protection of human health and resource conservation),. Therefore, it could contribute to the development of standards for the design and implementation of technologies for waste treatment.

CONCLUSION

MFA indicates that (1) home composting has the potential to minimize biodegradable waste entering the collection stream, and therefore it reduces the cost of collection and transportation and the use of landfills, and (2) anaerobic digestion greatly reduces the amount of waste that goes to landfills and contributes to biogas and compost production as well as high recycling goals implemented by circular economy requirements.

KEYWORDS

European Union, Landfill directive, Circular economy, Composting, Material flow analysis

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IMPLICATIONS OF ENVIRONMENTAL CREDENCE ATTRIBUTES ON FOOD MARKETING

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INTRODUCTION

Food products with environmental credence attributes generates differentiation on the assumption that consumer willingness to pay more derives from these attributes. This paper provides an overview of studies examining their impact on consumer's and possible implications for marketing aspects. By drawing some guidelines for development in the food production with environmentally creditable attributes, the conclusions indicate some issues that could also be subject to further research.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Food quality perception differs according to intrinsic and external product features (Ophuis and Van Trijp, 1995). Credence attributes as desirable benefits can't be promptly experienced and are difficult to assess during buying (Darby et al., 2008). Attributes and food quality drive value perception and buy intent, which can influence spending (Saba and Messina, 2003). Consumer behavior related to credence attributes effects buying preferences and marketing strategies implementation (Del Giudice et al., 2018).

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METHODOLOGY

By using scientific databases (Google Scholar, Web of Science/CAB abstracts, Scopus, Copernicus and EBSCO) an extensive search of the literature relating to environmental credence attributes and implications on food marketing was conducted.

The analyses was focused on two outcomes:

- Credence attributes related to intrinsic and extrinsic attributes,
- Indications environmental credence attributes has on food marketing

The selection process of analyzed publications followed the PRISMA guideline.

RESULTS

Different studies have examined the impact of several credence attributes on consumers' buying intentions influencing customers' willingness to pay more. This situation is affecting the categorization of attributes, where findings from data base of 40 studies are summarized. Results show that the significance of attributes does not change the practice of using different evaluation techniques, which suggests that methodology affects the magnitude of these attributes, not their significance.

DISCUSSION / POLICY IMPLICATIONS

Credence attributes are likely to be crucial factors for purchasing food. Consumers highly value them in relation to their health but are less concerned with sustainability of public goods, i.e. environment and biodiversity conservation. The reason could be poor knowledge about environmental credence attributes. To avoid this, marketing should emphasize eco-friendliness as the primary focus and transform a credence attribute into a search attribute where consumers can make selections based on reliable information.

CONCLUSION

The purchase decisions for food with credence attributes is primarily driven by personal health or experienced eating quality. Market success of eco-friendly food products requires a mix of environmental and other verifiable attributes that together signal credibility. Targeting motivated consumers, positioning brands and communication strategies should focus on convincing that environmental attributes confer an added value. Future research should be devoted to understanding the claims used for environmental credence attributes and

marketing strategies that enhance trust and loyalty toward environmentally safe products.

KEYWORDS

Credence attributes, Environment, Marketing, Consumers behavior, Consumer preferences

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POWDER RECYCLING FOR REDUCING THE PRICE OF ADDITIVE MANUFACTURING PRODUCTS AND REDUCING METALLIC WASTE DISPOSAL TO ENVIRONMENT

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INTRODUCTION

Metal additive manufacturing (AM), also known as 3D metal printing, enabled the production of complex and customized parts with high precision. However, effective management of metal powder in 3D printers is challenging as >80% of powder is wasted in this process. Powder recycling and Powder rejuvenation are available ideas to reduce cost and to protect environment from metallic waste. Here, 4 powder recycling strategies and powder reconditioning process are proposed to reduce powder waste in 3D printing process.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Industry is getting huge advantage of 3D printing (Montelione 2020; Brika 2020). However, reducing powder waste for cost and environment purposes is critical in line with EU directives (Quinn, 2019; Santecchia, 2019). Different powder recycling strategies were introduced (Alamos 2020; Powell 2020) and reported the impact of various recycling strategies on powder waste reduction and quality of parts printed from recycled powder (Vock, 2019; Leicht, 2018; Seyda, 2012). Here, we designed four strategies to develop a sustainable and cost-effective powder recycling process in 3D printing process.

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METHODOLOGY

Four distinct strategies A, B, C, D, and powder rejuvenation are considered while rejuvenated powder is considered almost as virgin powder here:

A: consistently mixing recycled and virgin powder after each build.

B: mixing the used powder with powder of the same age after each cycle.

C: reusing recycled powder after each build without mixing with other powders.

D: adding recycled powder to the top of unused virgin powder without mixing.

Rejuvenation: remelting and reproducing recycled powders as alternative to old powder.

RESULTS AND DISCUSSION

The best strategy will minimize powder waste and maximize the number of prints:

A: Part quality is comparably good but still the fresh powder is being used in each cycle too.

B: Maintains a balance between the recycled and fresh powders.

C: Reuses the most recycled powder but challenges generating sufficient reuse powder for subsequent builds.

D: doesn't reduce the part's quality but doesn't significantly minimize the process cost either.

CONCLUSION

Strategy A has more benefits compared to other strategies considering the part quality and traceability especially for regulated components produced in industry. Strategies B, C and D exhibit benefits in terms of diminishing powder waste but challenge with generating enough recycled powder for subsequent cycles. Powder reconditioning, as a new approach in powder recycling methods, can complement the deficit of all these strategies as is currently under our investigation.

KEYWORDS

Additive manufacturing, Powder recycling, Powder reconditioning, Strategies

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DOES FARM CERTIFICATION FOR SUSTAINABLE AGRICULTURE CONTRIBUTE TO FOOD EXPORT? A CASE STUDY IN MIDDLE-INCOME COUNTRIES

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INTRODUCTION

Agriculture contributes to economic growth while endangering the environment and causing global climate changes. This sector requires transformation in terms of sustainability and greening practices and payment (EC, 2019; EC, 2020; FAO, 2018; World Bank, 2021). Private standards in agriculture are created to support food traceability, safety and security. Simultaneously, they contribute to responsible agriculture and sustainability aims, with the focus on environmental sustainability.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Implementation of private standards in agriculture practices is a catalyst for transforming agricultural systems into environmentally sustainable ones, while supporting export performances of national economies (Andersson, 2019; Bain, 2010; Fiankor et al., 2020; Henson et al., 2011; Kleemann, 2016; Laosutsan, Shivakoti & Soni, 2019; Masood & Brümmer, 2014; Nupueng, Oosterveer & Mol, 2022). This support is more expressed in less developed countries than in high-income countries (Andersson, 2019).

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METHODOLOGY

The GLOBALG.A.P. standard is the leading private standard in plant production, oriented towards the holistic approach to sustainability and environmental responsibility on farms (GLOBALG.A.P., 2022). Using the example of 13 middle-income countries of Europe and Central Asia, we examined the impact of the GLOBALG.A.P. certification on national export results in the fruit and vegetable sector during the period 2010-2021. Descriptive statistics and panel regression were used for this analysis.

RESULTS

The panel regression results confirmed a statistically significant impact of the change of the GLOBALG.A.P. certified farmers' number on the: (a) growth of export values in the fruit and vegetable sector ($p=0.000$; $R^2=0.586$); (2) growth of export values of fruit and vegetable to high-value markets ($p=0.000$; $R^2=0.806$), as well as (c) on the growth of the percentage share of fruit and vegetable export to high-value markets compared to the total export of these two sectors ($p=0.011$; $R^2=0.586$).

DISCUSSION / POLICY IMPLICATIONS

The obtained results confirm and complement similar results reached by other authors (Andersson, 2019; Bain, 2010; Fiankor et al., 2020; Henson et al., 2011; Laosutsan, Shivakoti & Soni, 2019; Nupueng, Oosterveer & Mol, 2022). However, they do not confirm the findings of Kleemann (2016), Masood & Brümmer (2014) and Schuster & Maertens (2015), who question the contribution of the GLOBALG.A.P. certification to export results in less developed economies, particularly from farmers' perspective.

CONCLUSION

Stimulating the reforms focused on greening economies and improving resource and energy efficiency is crucial for all countries, particularly the less developed ones. Private standards in agriculture, based on sustainability principles, can significantly assist this turn. Their implementation requires fulfilling numerous pre-conditions, the most significant being building trust between all participants of the food supply chain and strengthening farmers' financial resources.

KEYWORDS

Agriculture, Farm certification, Environmental sustainability, Export performance, Middle-income countries

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CYCLING AND RECIPROCITY IN WEIGHTED FOOD WEBS AND ECONOMIC NETWORKS

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INTRODUCTION

We aim to make the economy circular to minimise its environmental footprint (Ghisellini et al., 2016; Webster, 2017). The economy is a network of material flows. Our goal relies on measuring and affecting cycling in this network. Its past studies sought inspiration in ecosystems (Odum, 1969; Jorgensen et al., 2015). We will present methodological issues around cycling, discuss our results and the guidance they might offer (Iskrzyński et al., 2022).

LITERATURE REVIEW / THEORETICAL BACKGROUND

Both ecosystems and economies rely on networks of nodes transforming and exchanging matter (Hannon, 1973; Leontief, 1991). Ecological networks have evolved over millions of years, which helps them being more robust and efficient than man-made systems.

Previous research (Schwarz & Steininger, 1997; Layton et al., 2016) comparing cycling of matter in ecosystems and economy was limited by relying on unweighted or few networks.

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METHODOLOGY

Overcoming this limitation, we studied mass cycling in large datasets of weighted real-world networks: 169 mostly aquatic food webs and 155 economic networks. We quantified cycling as the portion of all flows that is due to cycles, known as the Finn Cycling Index (FCI) (Finn, 1976).

RESULTS

We found no correlation between FCI and the largest eigenvalues of unweighted adjacency matrices used as a cycling proxy in the past (Borrett et al., 2007) (Layton et al., 2012). Unweighted networks ignore the actual flow values that in reality can differ by even 10 orders of magnitude (Okey et al., 2006).

FCI of food webs we studied has a geometric mean of 5%. We observed lower average mass cycling in the economic networks. The global production network had an FCI of 3.7% in 2011.

Cycling in economic networks (input–output tables and trade relationships) and food webs strongly correlates with reciprocity.

DISCUSSION / POLICY IMPLICATIONS

Encouraging reciprocity could enhance cycling in the economy by acting locally, without the need to perfectly know its global structure. One of such measures is industrial responsibility for products and parts supplied to a respective client.

CONCLUSION

Network analysis offers quantitative insights into circular economy. Sound methodology requires taking the actual values of material flows into account. Studies relying just on flow existence might give misleading results. The high correlation of reciprocity and cycling suggests strengthening bilateral exchanges to promote circular economy.

KEYWORDS

Economic networks, Applied graph theory, Cycling, Circular economy

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GREEN BOND PREDICTIONS: A WAVELET-NEURAL-NETWORK APPROACH

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INTRODUCTION

Despite efforts to prevent climate change, drastic consequences of human actions are becoming increasingly apparent (Sueyoshi et al., 2017). Fatal consequences e.g. are droughts, floods or natural disasters (Osberghaus, 2015). Green bonds as debt instruments aim to finance, e.g. green projects and to cope with the effects of climate change by incentivizing investors to 'go green' (Jiang et al., 2022). This paper predicts green bonds with wavelet neural networks (WNNs) (Doucoure et al., 2016).

LITERATURE REVIEW / THEORETICAL BACKGROUND

Studies, which apply wavelet conceptions to green bonds, mostly focus on dynamical interrelations (e.g. with carbon markets, see Ren et al., 2022), spillover effects and connectedness (see Khalfaoui et al., 2022) or on time-frequency co-movements (see Huang et al., 2023). Moreover, green bonds have shown to be chaotic and complex systems recently (see Vogl et al., 2023). In addition, the prediction of green bonds in themselves is scarce and considered a gap.

METHODOLOGY

The study implements a biorthogonal 'bior2.8' WNN with a deep learning multilayer perceptron (DL-MLP) network topology. WNNs replace the activation function with a wavelet, which is localized in time and can cope with complex system's data (see Alexandridis & Zapranis, 2014). Further, the root mean square error (RMSE), tracking signal (TS), mean absolute deviation (MAD) and the Akaike information

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criterion (AIC) are calculated. The predictions are conducted by an out-of-sample backtest.

RESULTS

The data of the logarithmic returns of the S&P Green Bond Index (2014-2023) has been deployed into the WNN with a 20-80 train-test split, resulting in ~ 350 out-of-sample predictions as given in Figure 1. Regarding performance, the RMSE (0.0052), the TS (0.7871) and the MAD (0.0026) are rather low, indicating a good predictive result. The AIC (-4871.6891) indicates a good model fit owing to a large negative value. In total, the predictions seem reasonable.

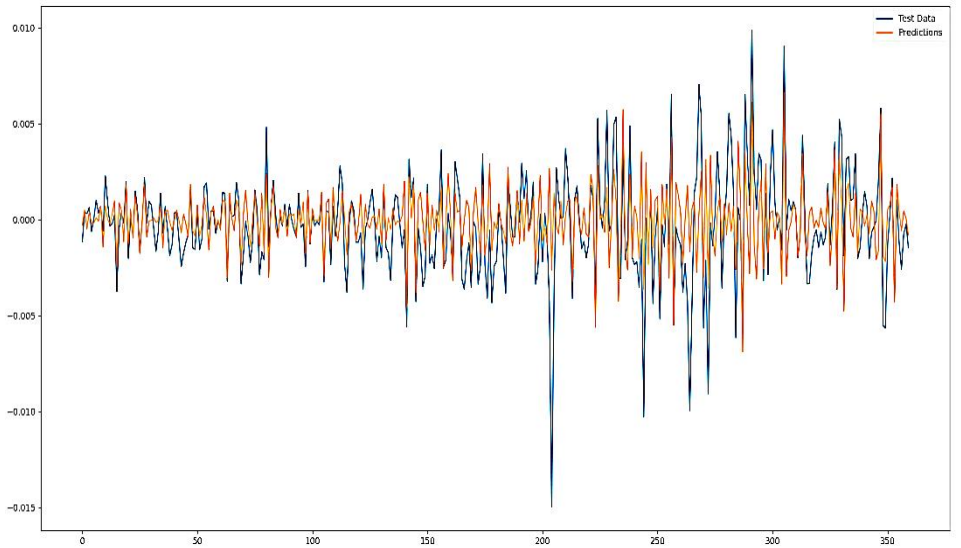

Figure 1: Out-of-sample backtest with ~350 steps. Orange line is the WNN prediction, while the blue line indicates the test data.

DISCUSSION / POLICY IMPLICATIONS

Following Beenstock et al. (2016) as an example, state that (climate) models, which are underlying policy decisions have not been "subjected to rigorous empirical testing". Furthermore, the selected models are not capable of handling complex or nonlinear interrelations. By applying a state-of-the-art, AI based time-frequency algorithm, i.e. a DL-MLP WNN, a functional method for green bond predictions can be used to better predict green project investments.

CONCLUSION

Within the study, a DL-MLP WNN based on a biorthogonal 'bior2.8" wavelet is calculated to predict the S&P Green Bond Index (2014-2023) out-of-sample. The predictive results are deemed as acceptable and can help enforce hedging or investing optimizations of green bond portfolio exposures.

The model is capable of handling the arising complex dynamics of the green bond series. With better predictions, a more granular policy or investment exposure creation strategy is assumed to be possible.

KEYWORDS

Green bonds, Wavelet neural networks, Climate change, Time-series predictions, Out-of-sample backtest

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GREEN MUNICIPAL BONDS ISSUANCE: AN INSIGHT INTO THE FUTURE PROSPECTS OF SERBIA AND ROMANIA

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INTRODUCTION

Unlocking novel channels for municipal borrowing holds importance for municipalities combating with immense financial challenges. Since green-labelled municipal bonds have begun to emerge as a preferable innovative funding option for municipalities in developed countries, the research aimed to investigate whether two adjacent Balkan states with distinct development levels – Serbia and Romania – have the potential for entering "greener" financial regimes and achieving municipal debt diversity of this kind.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Knowledge on Serbia's and Romania's (green) municipal bonds markets' features was gleaned from the modest literature foundation (Zipovski & Benković, 2014; Pop & Georgescu, 2015; Jolović & Jolović, 2021; Tiron-Tudor et al., 2021; Šoja & Grujić, 2022). Based on the theoretical evidence (Elmer, 2012; Saha & d'Almeida, 2017; Brand & Steinbrecher, 2019; Caporale & Spagnolo, 2023), green municipal bonds represent fixed-income financial instruments slated for raising capital for sustainability-focused projects with positive environmental/climate benefits for local communities (pollution prevention, renewable energy, low-carbon

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transportation, sustainable land use, biodiversity conservation, responsible waste management projects, etc.).

METHODOLOGY

The research methodology relied on both qualitative and quantitative approach (desk research and logistic regression method). Furthermore, the empirical study was mainly built on the secondary data on borrowing arrangements of Serbia's and Romania's local governments, available in the official records of the relevant counties/municipalities/cities/communes. The empirical analysis covered the 2001-2023 interval, i.e., included Serbian and Romanian municipalities' initial and current endeavors to attain indebtedness through municipal bonds' issuances.

RESULTS

The obtained research results unveiled that in the 2001-2023 interval several Serbian and Romanian counties/municipalities/cities/communes augmented their legal/administrative infrastructure and technical capacity for issuing green-labelled municipal bonds. Namely, municipal bonds' issuance by private placement/public offering has been carried out by 4 Serbian municipalities/cities, videlicet, by 33 Romanian counties/municipalities/cities/communes so far. Adding a green label to the aforementioned municipal bonds and tying them as such into municipalities' borrowing plans is acknowledged as feasible and desired in both states, since Serbia's and Romania's strategic/legal frameworks provide the elementary ambience required for this kind of emissions and acknowledge the critical role that green municipal bonds can play in financing local development.

DISCUSSION / POLICY IMPLICATIONS

Green municipal bonds are considered a superior mechanism for financing local development. Albeit without the green label, municipal bonds have already been successfully used as economical financing avenues in both Serbia and Romania – for example, the city of Novi Sad, as the first Serbian city that issued municipal bonds (the tranche, which had RSD 3.5 billion value, was issued via private placement in May 2011), generated funds which were used for the purpose of finalization of the construction project of the city's largest boulevard and the sewerage network in certain suburban settlements (Pavlović et al., 2012); simultaneously, the municipalities Predeal and Mangalia, as the first Romanian municipalities that issued municipal bonds (the tranches, which had RON 5 billion and RON 10 billion value, respectively, were issued via public offering in October 2001), generated funds which were used for the purpose of constructing novel

tourist entertainment facilities (Bercu & Onofrei, 2007; Bucharest Stock Exchange, 2023). Thus, these examples perfectly demonstrate that the aforementioned funding method works great in practice and that incorporating a "green component" to emissions of this kind should be perceived and used as a major local development opportunity.

CONCLUSION

Green municipal bonds are acknowledged as an essential vehicle for funding local development in Serbia's Sustainable Urban Development Strategy until 2030, i.e., Romania's Sustainable Development Strategy 2030 and Government Public Debt Management Strategy 2022-2024. Although all the necessary legal conditions are being progressively created, this financing mechanism has not yet been utilized in Serbia and Romania. However, Serbia is one step ahead of Romania in this regard, since it already gave impetus to the green market development in 2021 (by issuing the first green bond, which had EUR 1 billion value) – Romania is expected to carry out the first green bond's issuance by the end of 2023 (Public Debt Administration of Serbia, 2023; Ministry of Finance of Romania, 2023). Finally, prospects for the green municipal bonds markets' development in Serbia and Romania could be labelled as promising, since both states have certain municipal bonds' issuance histories and basic strategic/legal frameworks necessary for successful green bonds emissions.

KEYWORDS

Green finance, Green bonds, Municipal bonds, Serbia, Romania

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CRITICAL SUCCESS FACTORS, SUSTAINABILITY AND CLIMATE CHANGE: HYBRID FLOOD PROTECTION AND DRINKING WATER SUPPLY IN A GERMAN WATER ASSOCIATION

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INTRODUCTION

Owing to climate change, water scarcity and water stress are an imminent threat to the global society (Debele et al., 2019). Natural hazards get more severe and frequent (Hake et al., 2016). Hence, avoiding critical system failures by provision of safe drinking water supply and functional flood protection are crucial tasks (Scheffler, 2020). This study presents the use of critical success factors (CSF) to build an autarkic surface water plant with ~ 65 Mio. €, thereby addressing climate change.

LITERATURE REVIEW / THEORETICAL BACKGROUND

A systematic review of the tension field is proposed in Scheffler and Vogl (2022) providing a bibliometric content and citation network analysis. The literature agrees on the existence of increasingly severe natural disasters, occurring more frequently and, thus, threatening the human existence (Kareiva & Carranza, 2018). Further, the water sector is in the fourth revolution, i.e. transforming towards a "human-water-data-nexus" (Poch et al., 2020). CSFs are unclear (Scheffler, 2020).

METHODOLOGY

The paper is based on the results of a larger research study, which started 2010 as a case study and encompasses over eight research papers, whose insights are directly implemented. Derived CSFs for mega-project realizations have been used

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to enable the water plant. The policy application and implementation of an according knowledge management system is given in Scheffler and Vogl (2022) and the planning of an AI-based decision support system in Vogl and Scheffler (2023).

RESULTS

Core result of the study is the deviation of water sector relevant CSFs (see Figure 1) (Scheffler, 2020). However, the dimensions of digitalisation and sustainability are to be seen as CSF as well (Vogl & Scheffler, 2023). By applying the CSFs, the planning of the surface water plant has been shortened to several months, instead of 20 years as seen in previously failed mega-projects. Therefore, a template for future projects in Europe has been derived, thus, enhancing sustainable climate solutions.

DISCUSSION / POLICY IMPLICATIONS

The implementation of the CSFs on a policy level can be stated as success. The practical operational implementation is demonstrated in Vogl and Scheffler (2023), proposing IT project taxonomy solutions. In general, mega-project speed-ups would enable sustainable and fast reactions to climate change on a policy level as well as an exploitation of “windows of opportunities” as given in the Kingdon’s streams model (Vogl & Scheffler, 2023; Herweg, 2015). Thus, hybrid solutions are future avenues.

CONCLUSION

By integrating knowledge management, sustainability principles and CSFs, this study illustrates a functioning mechanism against climate change. CSFs can be utilized at a policy level to enable mega-projects, which in a hybrid setting allow to reduce the strain on ground-water levels and to cope with climate change effectively. Paired with the notation of sustainability and digitalisation, a practical implementation is derived, which serves as a holistic template for future European projects.

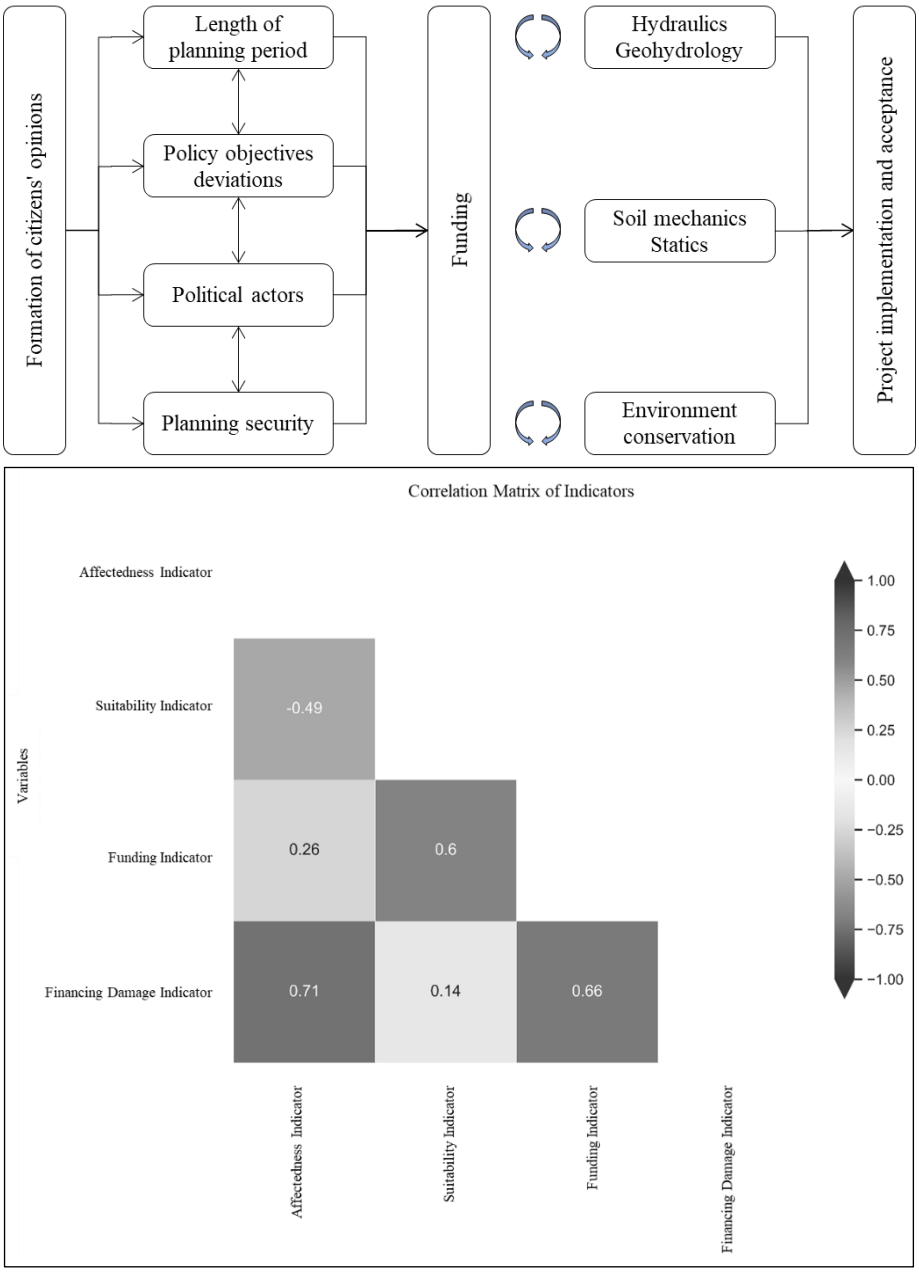

Figure 1. (Top): Model of the overall process of CSFs and their interdependence within the knowledge- management process implementation (Scheffler & Rietze, 2017). (Bottom): Representation of the correlation matrix of the indicators formed as proposed in Scheffler (2020).

KEYWORDS

Hybrid flood protection and drinking water supply, Climate change, Digitalisation, Sustainability, Critical success factors

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THE MCDM-BASED ASSESSMENT OF SOLUTIONS FOR TRANSITION TO SUSTAINABLE INDUSTRY 4.0

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INTRODUCTION

Industry 4.0 implies the transformation of organizations into digital entities (Sony & Naik, 2020). It represents a new level of industrial development that has changed demands, competition, industry structure, and sustainability awareness (Dalenogare et al., 2018). The primary objective of this paper is to use Multiple-Criteria Decision Making (MCDM) to identify the principal obstacles and solutions for successfully adopting the technologies that will facilitate a transition of the Serbian industry to sustainable Industry 4.0.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Until now, the authors have used the MCDM approach to analyze different issues regarding Industry 4.0. The topics that gained the researcher's attention are as follows: comparing the Industry 4.0 maturity models (Elibal & Özceylan, 2022), supply chain improvement (Hsu et al., 2022), strategy prioritization (Kumar et al., 2021; Erdogan et al., 2018), technology assessment (Javaid et al., 2022; Chang et al., 2021), cybersecurity evaluation (Torbacki, 2021), and sustainability (Eldrandaly et al., 2022).

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METHODOLOGY

The barriers and solutions submitted to the evaluation are borrowed from Javaid et al. (2022). The barriers' significance was defined using the Preference Selection Index – PSI (Maniya & Bhatt, 2010). The assessment of the solutions is performed by three decision-makers and the following MCDM methods: PSI, Compromise Ranking of Alternatives from Distance to Ideal Solution – CRADIS (Puška et al., 2022), and Integrated Simple Weighted Sum Product Method—WISP (Stanujkic et al., 2021).

RESULTS

The results revealed that logistics and reverse logistics management, and technology integration are the most significant barriers. The significance of logistics and warehousing management lies in its role as a crucial facilitator for the sustainable development of industries, ensuring efficient and responsible movement, storage, and distribution of goods. Also, the application and development of new technologies can improve efficiency and reduce environmental impact of Serbian industry.

DISCUSSION / POLICY IMPLICATIONS

The used framework, based on the MCDM methods, enabled the assessment of the barriers and solutions for technology adoption in light of the current business conditions in the Republic of Serbia. The managers and policymakers could easily perceive the main obstacles and optimal actions to fulfill the requirements of Industry 4.0 and to promote sustainable operating. The propositions for future research are directed at introducing the fuzzy MCDM models to better express the decision-maker's opinions.

CONCLUSION

The identification of main barriers and solutions for adopting technologies by application of MCDM-based framework are crucial for the transition to sustainable Industry 4.0. The paper proposed significant methodological framework for barriers and solution identification based on combined application of the PSI, CRADIS, and WISP methods. Its application on the data of three competent decision-makers presented its usability in the decision-making process.

KEYWORDS

Sustainable Industry 4.0, PSI, WISP, CRADIS, Technologies

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CHALLENGES IN THE IMPLEMENTATION OF GREEN HYDROGEN IN WESTERN ANDALUSIA: AN ANALYSIS FROM A SOCIAL PERSPECTIVE

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INTRODUCTION

Green hydrogen is the new promising renewable energy vector. Unlike previous renewable energy vectors, this is leading to an increasing number of announcements of commercial applications (green hydrogen projects). For these projects to become real, new technologies must be developed and implemented at commercial scale (both directly related to hydrogen, such as electrolysis, but also indirectly related, such as offshore wind energy). Two aspects stand out for the success or failure of its actual implementation, i.e., the legislative framework for regulating technologies, and the study of the social acceptance of the measures adopted.

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LITERATURE REVIEW / THEORETICAL BACKGROUND

Looking at the applicable regulatory context, there are no specific regulations covering socially acceptance interaction between its content. However, the applicable regulation, Law 21/2013 (2013), on environmental assessment in Spain specifies in its articles 36 and 37 the need to attend to formal public participation, through public information of the project and the environmental study and through consultation with the affected Public Administrations and interested persons.

METHODOLOGY

Considering the complexity of the problem, the methodology proposed entails the segregation of a whole. Thus, it will be possible to analyse each of the parts and the relationship between them and with the whole. For this analysis, it will be assumed that social acceptance is mainly a function of three sets of variables i) the integration of the installation into the environment, ii) the objective risk perception and iii) the situation of the potentially affected population.

RESULTS

To date, the most explicit international work has been done in the field of wind energy. Hence, assessments have been conducted on the factors influencing the social acceptance of this type of project Szarka et al. (2012). Based on references from studies analysing offshore wind parks in the Spanish province of Cadiz, it has been found that the acceptance of these proposals is associated with the relationship between the project and its compliance with the regulations established by the administrations Florido del Corral (2005).

DISCUSSION / POLICY IMPLICATIONS

According to the analysed background, an in-depth study is necessary with the aim of proposing the necessary directives that meet the needs of the project and can be integrated into the current legislation. For this, it will be necessary to consider the different works in which this type of studies is performed, such as the Manual Rodríguez Rasero et al. (2015), prepared by the Junta de Andalucía in 2015, for the assessment of the health impact of projects subject to environmental prevention and control instruments.

CONCLUSION

Approach to the project from a regulatory compliance point of view can be crucial to its success or failure. Also, the study of social acceptance will be crucial to ensure the success of the project's development. Yet, there is no explicit regulation on how to conduct public consultations. So, the proposed work on the social acceptance of the implementation of green hydrogen technologies in refineries will be done by proposing the necessary directives to regulate such studies.

KEYWORDS

Hydrogen, Decarbonisation, Chemical clusters, Refineries, Social acceptance

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BIBLIOMETRIC ANALYSIS ON DIGITALIZATION AND CIRCULAR ECONOMY

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INTRODUCTION

Globally, communities and economies have gone through a significant change following the digital revolution, which has also revolutionized how information is accessed, shared, and used. Simultaneously, the circular economy has emerged as a key concept in relation to discussions about sustainable development due to growing worries about resource depletion and environmental damage. The purpose of this extended abstract is to explore the complex interactions between the circular economy and digitalization, as well as the resulting policy implications by performing a bibliometric assessment of "digitalization" and "circular economy" literature using the Web of Science database will be performed utilizing with the R programming language. This study intends to contribute to the creation of efficient policies for utilizing the advantages of digitalization to promote the use of circular economies by examining potential synergies and difficulties.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Earlier literature provides insights into the role of digitalization in promoting circular economy practices and underline the potential opportunities for sustainability and remanufacturing (Ghobakhloo, 2020; Kerin & Pham, 2020). Most of these studies suggest that digitalization can play a vital role in advancing the circular economy agenda set by the policy makers (Antikainen et al., 2018). In accordance, this paper will provide an extensive review on this topic and will look at the intersection of digitalization and circular economy to answer the questions such as; what are the main research topics studied by the earlier literature and what kind of policies can be implemented following the current research outcomes.

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METHODOLOGY

Bibliometric assessment on “digitalization” and “circular economy” literature using the Web of Science database will be performed by utilizing bibliometrix package in R studio. Descriptive statistics including annual scientific production, and average citation per year will be provided. Top journals where the “digitalization” and “circular economy” research was published and their impact, together with publication progress over time will be examined. Data patterns will be visualized and notable research trends in the above field will be detected showing most reproductive authors, institutions, and countries, as well as existing networks. Collaboration network analyses will be performed to project collaboration networks between authors, institutions, and countries.

RESULTS

We will perform a bibliometric analysis on scientific documents that focus on the interactions between digitalization and circular economy. The literature will be extracted ftom Web of Science (Wos) database. Only peer-reviewed scholarly (original research) journal articles that are in the English language are included in the search results following the inclusion/exclusion criteria (review articles are excluded). The search strategy used the keywords of (“circular economy” or “recycling economy”) and (“digit*”) and by using Boolean (AND, OR) operators. Original search strategy yields 836 results. After applying inclusion/exclusion criteria to include only original research articles in the English language, the results reduce to 575 results (review articles, proceeding papers and book chapters are excluded).

DISCUSSION / POLICY IMPLICATIONS

The findings of this research will have several policy implications for both national and international stakeholders engaged in promoting sustainable development:

1. Legislative Frameworks: Policymakers should establish comprehensive legislative frameworks that support the integration of digital technologies into circular economy strategies. This includes developing regulations that encourage the adoption of digital solutions for resource tracking, waste management, and supply chain optimization.
2. Innovation and Collaboration: Policymakers should promote cross-sectoral collaboration between technology providers, businesses, research institutions, and civil society organizations. This collaboration can drive

innovation in digital tools and platforms, as well as facilitate knowledge-sharing and capacity-building initiatives.

3. Education and Awareness: Policy interventions should prioritize educational programs and awareness campaigns to enhance digital literacy and promote understanding of the circular economy principles. This will ensure that individuals and businesses can effectively leverage digital technologies to support sustainable production and consumption patterns.
4. Public-Private Partnerships: Governments should foster public-private partnerships to encourage investment in digitalization projects aligned with circular economy objectives. This collaboration can provide financial and technical support for the development and implementation of innovative digital solutions.

In conclusion, the research on the intersection of digitalization and the circular economy presents significant opportunities for policymakers to harness the transformative potential of digital technologies for sustainable development. With this study, we aim to provide a roadmap for governments and other stakeholders to design effective strategies that can accelerate the transition towards a circular economy, leading to improved resource efficiency, reduced environmental impact, and enhanced economic resilience.

CONCLUSION

This study will provide a detailed bibliometric analysis of the literature on the intersection of circular economy and digitalization to find out the most popular research trends and results that will yield important policy implications. We will be able to determine the main research themes, important keywords, the most productive authors in the field and the research collaborations existing between countries and institutions.

KEYWORDS

Digitalization, Circular economy, Bibliometric analysis, Biblioshiny, R

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LONG WAVES IN ENERGY BEHAVIOUR-SOME GLOBAL EVIDENCE

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INTRODUCTION

A long-wave hypothesis, due to Kondratieff (1935), stipulates that time series, such as commodity prices, interest rates, wages and energy aggregates, exhibit cycles lasting 45-60 years (through to through). Numerous studies tested Kondratieff's long-wave hypothesis, mainly focusing on commodity prices. The main research objective of this study is to question the existence of long waves in various energy production and consumption time series.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Cuddington & Jerrett (2008) test the presence of supercycles in the prices of six metals traded on the London Metal Exchange in the past 150 years, while Jerrett & Cuddington (2008) broaden this search to three additional metals: steel, iron, and molybdenum. By focusing on the same period, Erten & Ocampo (2013) analyzed supercycles in the prices of non-oil products. Finally, Férnandez et al. (2020) propose a common stochastic trend representation of supercycles for various commodity prices.

METHODOLOGY

This research applies Christiano-Fitzgerald's (2003) band-pass filter in extracting Kondratieff's long waves in global energy consumption data in the last 200 years. The ''ideal'' band-pass filter uses an infinite number of leads and lags, while one must use a finite number of leads and lags when dealing with finite samples. Christiano and Fitzgerald (2003) develop alternative finite sample approximations to the “ideal” band-pass filter, both symmetric and asymmetric, which this study utilizes.

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RESULTS

Some preliminary econometric results identify a long wave in the behaviour of global energy consumption in the last 200 years. The results are, to a certain extent, robust concerning different detrending methods (mean removal vs linear detrending), stationarity assumption of shocks (I(0) vs I(1)), and fixed length symmetric vs full sample asymmetric band-pass filter type.

DISCUSSION / POLICY IMPLICATIONS

The preliminary empirical results of this research might be relevant for constructing a small mineral market model along the lines of Cuddington and Zellou (2013), which policymakers could use for running simulation exercises and scenario analyses for conducting macroeconomic and energy policies.

CONCLUSION

This study tested the presence of the long-wave hypothesis in the case of global energy dynamics in the last 200 years. Potential avenues for further research include broadening the analyses for different countries and energy products to generalize the preliminary findings of this research.

KEYWORDS

Long waves, Supercycles, Christiano-Fitzgerald band pass filter

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RENEWABLE ENERGY CRITERIA FOR RANKING SELECTED BALKAN COUNTRIES – TOPSIS ENTROPY APPROACH

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INTRODUCTION

Energy is considered as a factor of strategic importance for the reduction of energy dependence, global pollution and the growth of economic prosperity. In modern conditions, the transition from traditional to renewable energy sources represents the dominant occupation of countries. Therefore, the aim of this paper is to rank selected Balkan countries according to selected economic, ecological and social criteria, as dimensions of sustainability. The ranking was performed using the multi-criteria decision-making method - Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS).

LITERATURE REVIEW / THEORETICAL BACKGROUND

Based on the literature review, it can be said that there are different criteria that should be included in consideration when talking about renewable energy. Accordance to the relevant literature, the criteria GDP per capita, Easy of Doing Business Rank, CO_2 emission, SDG 7.1, Electricity capacity of total renewable energy, and Human Development (HDI) index were selected. Also, based on the literature review, it was observed that by using the TOPSIS method it is possible to determine the ranking of countries in this area.

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METHODOLOGY

The TOPSIS multi-criteria decision-making method was used to rank the Balkan countries. This method gives the solution that is the most distant from the negative ideal solution, while at the same time the smallest distance from the positive ideal solution. Criteria weights are determined by the entropy method, as an objective method for assigning criteria weights.

RESULTS

Using the entropy method, it was determined that the most important criterion is CO_2 emissions. Based on the application of the TOPSIS methodology, results were obtained indicating that the best-ranked Balkan country is Greece. In order to prove the viability of the proposed model, a sensitivity analysis was additionally carried out, which showed that Greece retains the first rank in five scenarios. In scenarios where the weight of the CO_2 criterion has values in the range of 0.5 to 0.9, Albania is the first ranked country.

DISCUSSION / POLICY IMPLICATIONS

The obtained results are in accordance with previously conducted studies on a similar topic. It was observed that developed countries, such as Greece and Albania, have better potential for further development, while less developed countries, such as Bosnia and Herzegovina, Montenegro and North Macedonia, have certain weaknesses that they must work on. This particularly applies to GDP per capita, Electricity capacity of Total renewable energy and HDI index.

CONCLUSION

Renewable energy is an important building block of sustainable development and must be nurtured as such. Due to its numerous advantages, renewable energy represents a very important potential for the development of less developed countries, which includes most of the Balkan countries. By applying a multi-criteria model, this research has a significant contribution and points out the weak and strong sides of the criteria that are important for renewable energy.

KEYWORDS

Balkan countries, TOPSIS, Renewable energy criteria

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DETERMINANTS OF CARBON DIOXIDE EMISSIONS IN OECD COUNTRIES

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INTRODUCTION

Economic factors such as industrial activity, GDP growth, energy consumption and production patterns, technological advancements, population growth and urbanization, and regulatory frameworks all have an impact on carbon dioxide (CO_2) emissions in OECD countries. It is crucial to comprehend these drivers in order to successfully create solutions to mitigate climate change and advance sustainable development. The research question is to identify and elaborate on the main determinants of carbon dioxide emissions in OECD countries.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Promoting the use of energy-efficient technologies and renewable energy sources is crucial for reducing emissions. Emissions from population increase and urbanization are reduced by efficient urban design and environmentally friendly transportation. Collective action is encouraged by policy frameworks, particularly global agreements like the Paris Agreement. The formulation of policies to promote sustainable development and reduce CO_2 emissions in OECD countries is aided by an understanding of these determinants.

METHODOLOGY

Ordinary Least Squares (OLS) and Lasso regression can both be used to study the factors that influence CO_2 emissions in OECD nations. In contrast to Lasso, which handles variable selection and multicollinearity, OLS calculates linear relationships by reducing residuals. When compared to Lasso, OLS delivers a more thorough perspective. OLS makes a linearity assumption but is delicate to outliers and multicollinearity. Although bias may be introduced, lasso mitigates these problems. A combined strategy ensures a thorough examination of the factors influencing CO_2

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emissions in OECD nations, taking into account both general patterns and variable choice.

RESULTS

Insightful conclusions emerged from the analysis of the factors that influence CO_2 emissions in OECD nations, with the Lasso regression method exceeding OLS regression in terms of variable selection and model simplicity. This demonstrates how well Lasso selects the most crucial variables while taking multicollinearity into account. The outcomes of the Lasso regression show its superiority in capturing the key drivers of CO_2 emissions in a more simplified and understandable way. The main significant variables, respectively determinants of CO_2 emissions in OECD countries, in the regression models are the selected variables: agricultural land, air transport, arable land, coal rents, combustible renewables and waste, energy, foreign direct investments, GDP per capita, population, population density, poverty gap, trade and transport.

DISCUSSION / POLICY IMPLICATIONS

The findings have significant policy ramifications. Decoupling economic growth from carbon-intensive activities, advancing renewable energy sources, and fostering technical advancements should be the main goals of policymakers. Strong policy frameworks, effective transportation networks, and sustainable urban planning are critical. It is crucial to foster global collaboration through agreements like the Paris Agreement. OECD nations may effectively reduce CO_2 emissions, mitigate climate change, and accomplish sustainable development goals by putting these policies into practice.

CONCLUSION

In conclusion, the analysis emphasizes the significance of Lasso regression in identifying important determinants of CO_2 emissions in OECD countries. Economic factors such as energy production, population growth, urbanization and others emerged as key drivers of CO_2 emissions. Policymakers should prioritize interventions in these areas to effectively reduce emissions and promote sustainability. By implementing these findings, OECD countries can make meaningful progress in mitigating emissions, addressing climate change, and fostering sustainable development.

KEYWORDS

Carbon dioxide emissions, Determinants, OECD, Lasso regression

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THE NEXUS BETWEEN CO_2 EMISSIONS AND RENEWABLE ENERGY IN CEE COUNTRIES: A PANEL APPROACH

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INTRODUCTION

While relations between conventional energy sources and CO_2 emissions in emerging and developing countries have undergone extensive research, the contribution of renewable energy to green development in those groups of countries is still insufficiently explored. The main objective of this paper is to examine and quantify association between CO_2 emission and electricity production from renewable sources in 15 CEE countries.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The CEE countries are still heavily dependent on energy-intensive industrial production (Fedajev et al., 2019). The dynamics of industrial production is closely linked to the availability and cost of energy (Greenwood et al., 2005; Melick, 2014), and developing economies struggle to ensure a stable and cost-effective energy sources for their industries (Thomas et al., 2010). To this end, it is essential to establish cost-effective energy supply (Andersen & Dalgaard, 2013).

METHODOLOGY

Based on the theoretical discussion and literature review, we formulated the econometric panel model that relates CO_2 emission to the electricity production from renewable sources and other relevant variables. To shed light on potential estimation problems, we looked at the properties of the model residuals. Finally, we estimated the empirical model using various panel estimators that align with

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the specific characteristics of our data, aiming to ensure the accuracy and dependability of our estimates.

RESULTS

The findings from the empirical analysis indicate the presence of robust evidence supporting the association between CO_2 emissions and electricity production from renewable sources. According to the model estimation results, one percentage point increase in renewable electricity production growth in CEE countries reduces CO_2 emissions within the range 0.11 to 0.13 percentage points.

DISCUSSION / POLICY IMPLICATIONS

The results of this research indicate that increasing production of renewable electricity would have a positive impact on green development in CEE countries. To encourage the higher use and production of renewable energy in these countries, it is crucial to implement appropriate policies and institutional frameworks to promote renewable energy development and modernize electricity sector, such as public-private partnerships and provision of tax incentives.

CONCLUSION

Promoting sustainable development based on the renewable energy sources play an important role in decreasing the CO_2 emission in CEE countries. In spite of the potential to increase use of renewable energy in CEE economies, these countries continue to encounter technical, economic, and social challenges in production of electricity from renewable sources. Subsequently, these countries should prioritize public policies that encourage investments in renewable energy projects.

KEYWORDS

Renewable electricity, CO_2 emissions, CEE countries

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THE DYNAMIC INTERRELATIONSHIP BETWEEN RESEARCH OUTPUT IN THE ENERGY FIELD AND CARBON DIOXIDE EMISSION: EMPIRICAL EVIDENCE FROM G7 COUNTRIES

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INTRODUCTION

Increased economic activity implies a larger energy supply (Raghutla and Chittedi, 2020), which calls for the use of more fossil fuels (Töbelmann and Wendler, 2020). Given the need for reducing the negative effects of energy on the environment without compromising future economic growth, this research aims to analyze the dynamic interrelationships between CO_2 emissions in the G7 group of countries and research output in the field of energy.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Energy-related R&D investments have decreased in developed and developing economies since the 1980s (Alam et al., 2020). Scientific papers are vital for evidence-based policymaking (Đuričin et al., 2022). De Gouveia and Inglesi-Lot (2021) conducted a unique analysis, revealing a bidirectional causal link between climate change research output and CO_2 emissions in developed economies, and a one-directional link in developing economies.

METHODOLOGY

The research utilizes energy-related scientific publications from the SCImago database to measure research output. CO_2 emissions data from the World Bank database serves as the indicator. The study spans 1996 to 2019. Using levels instead of first differences, the Vector Autoregression (VAR) model was employed. Several

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authors (Ashley and Verbrugge 2009; Gospodinov et al., 2013) confirm its validity, even with unit roots in the underlying variables.

RESULTS

Increased scientific output in the field of energy in France, Germany, Italy, the United Kingdom, and the United States correlates to lower CO_2 emissions. France, the United Kingdom, and the United States have seen both short-term and long-term impact, whereas Germany can only reliably identify the short-term impact. In Canada, increased CO_2 emissions boost research production in energy in the short and long run. In Japan, no interrelationships have been discovered.

DISCUSSION / POLICY IMPLICATIONS

Across most G7 nations, a rise in energy-related scientific productivity leads to decreased CO_2 emissions, showcasing the use of research to tackle energy and environmental concerns, and reduce CO_2 levels. These findings contradict de Gouveia and Inglesi-Lot's study (2021). Canada's scientific community has intensified energy research due to increasing CO_2 emissions, yet no corresponding impact on CO_2 emissions is observed.

CONCLUSION

This research highlights the role of energy publications in addressing CO_2 emissions by creating knowledge, identifying solutions, and driving innovation. However, it stresses that scientific papers alone cannot effectively reduce emissions. Implementation of research, stakeholder participation, and strong policies are crucial in translating scientific information into actionable steps for emission reduction.

KEYWORDS

Research output, Environment, Energy, CO_2 emissions

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MACROECONOMIC EFFECTS OF HEAT-RELATED LABOR PRODUCTIVITY LOSSES IN AUSTRIA

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INTRODUCTION

The summer of 2022 with an estimated 60,000 heat-related deaths in Europe (Ballester et al., 2023) was a clear signal that rising temperatures caused by the

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climate crisis have enormous consequences on human health. All The latest climate mode predictions indicate a future increase in the number and extent of heat waves in Europe. These heat waves cause adverse health effects which also have economic costs, ranging from the costs of treatment and therapy to losses in productivity. We apply an agent-based macroeconomic model for Austria to quantify the economic consequences of heat-related reductions in labor productivity.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Based on greenhouse gas emissions and related temperature scenarios published by the Intergovernmental Panel on Climate Change (IPCC), Hübler and Klepper (2007) develop scenarios on the development of human heat stress in Germany. Then, based on a study by Bux (2006), they estimate resulting losses of labor productivity. According to studies cited there, the reduction in productivity in the temperature range of 26 to 36°C varies between 3 and 12 percent, depending on the type of job. These labor productivity reductions lead to GDP losses in the range of 0.12 to 0.48 percent.

METHODOLOGY

We apply an agent-based model (ABM) of the small open economy of Austria. The model is described in detail in Poledna et at. (2023). The ABM considers the following sectors: firms, private households, the general government, banks including the central bank, and the rest of the world. Each sector consists of heterogeneous agents representing either natural persons or legal entities. The firm sector is made up of 64 industries, each producing a perfectly substitutable good with labor, capital, and intermediate inputs from other sectors with a fixed-coefficients (Leontief) technology. The model has been applied to assess the medium-run macroeconomic effects of lockdown measures taken in Austria to combat the COVID-19 pandemic (Poledna et at., 2023), and to estimate the economic impacts of flood events in Austria (Bachner et al., 2023).

RESULTS

We apply (higher) sector-specific reductions in labor productivity for the most vulnerable sectors, the largest in the construction sector, and additionally assume that heat waves result in lower productivity in the remaining sectors. The ABM simulations will show the consequences for gross value added and employment in each sector as well as the total economy. The sectoral impacts will depend on the initial shock(s), but also on the sectoral linkages.

DISCUSSION / POLICY IMPLICATIONS

The climate crisis and the resulting increase in the number and extent of heat waves has various economic implications. In this paper we focus on labor productivity losses, but the rising number of deaths, more sick leave days, crop failures in agriculture, negative impacts on electricity production, higher electricity demand, air conditioning supply and demand as well as changes in international tourism are also to be expected. Hence, sectoral and macroeconomic effects of labor productivity reductions most likely underestimate the true economic costs of increasing heat waves.

CONCLUSION

Based on our model simulation results, we estimate the magnitude of the macroeconomic effects of heat-related labor productivity losses, although the exact numbers of GDP and employment reductions have to be interpreted with caution. At least the results will identify those sectors where, based the direct effects and on the production linkages, the largest economic consequences can be expected.

KEYWORDS

Agent-based modeling, Macroeconomic modeling, Austria, Climate crisis, Heat waves

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THE REBOUND EFFECT OF RESOURCE EFFICIENCY FOR THE EU AND ITS MAJOR TRADING PARTNERS: A STOCHASTIC FRONTIER ANALYSIS

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INTRODUCTION

Material consumption is crucial because a significant percentage of greenhouse gas (GHG) emissions are caused by the energy embodied in materials. In this context, improving material and energy efficiency is seen to be extremely crucial for lowering emissions (Aidt et al., 2017; Hertwich et al., 2019; Boldoczki et al., 2021; Skelton & Allwood, 2017; OECD, 2019). However, they may have a rebound effect. In this study, we comparatively investigate the material and energy efficiency performances, as well as their rebound effects, for the European Union (EU) member countries and their main trading partners using the Stochastic Frontier Analysis (SFA) approach, and discuss which trading partners may be more exposed to and affected by the Carbon Border Adjustment Mechanism (CBAM). This is the first study to use the SFA approach to assess the material and energy efficiency performances for the EU member countries and their main trading partners.

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LITERATURE REVIEW / THEORETICAL BACKGROUND

The rebound effect of material efficiency, compared to that of energy efficiency, has received less attention (Meyer et al., 2007, 2012; Pfaff & Sartorius, 2015; Saunders, 2014; Skelton et al., 2020). A theoretical framework for the raw material rebound effect is developed by Saunders (2014), who also underlines the crucial importance of material efficiency. Skelton et al. (2020) consider both energy and material rebound effects across a range of efficiency scenarios in the automotive sector supply chain by employing a macroeconomic computable general equilibrium (CGE) model for the UK. The findings reveal that material rebound effects—rather than energy rebound effects—are more likely to offset the UK's emissions reductions. Our study differs greatly from Skelton et al. (2020) in terms of its scope, methodology, and country sample covered.

METHODOLOGY

In this study, we employ the SFA approach (Filippini and Hunt, 2015; Kumbhakar et al., 2015) improved by Orea et al. (2015) using the rebound effect. The key benefit of this model is that it can estimate efficiency and the rebound effect simultaneously. Besides, as it quantifies the rebound effect in terms of its determinants, it also makes it possible for us to identify the primary rebound effect determinants. The empirical analysis of the study contains data from the 26 EU members and the top 10 trading partners of the EU. The dataset covers the years from 1995 to 2019. We compile our dataset from various sources: The World Bank Development Indicators (WDI, 2022), United Nations Environment Programme International Resource Panel Global Material Flows Database (UNEP-IRP, 2022), International Monetary Fund Primary Commodity Prices database (IMF, 2022), and the British Petroleum Statistical Review of World Energy (BP, 2022). We specify two different models: stochastic material demand model and stochastic energy demand model.

RESULTS

We first estimate the stochastic material and energy demand models. The estimation coefficients for both material and energy consumption are consistent with our expectations and primarily exhibit similarities in terms of their sign. As an illustration, income is both highly positive and elastic for both material and energy. Second, we measure energy and material efficiency performance of countries in the sample and estimate the rebound effects associated with these efficiency measurements. We find that while less developed EU members and trading partners generally ranked lower in material and energy efficiency ratings, more

developed EU countries and their rich trading partners generally ranked higher. Third, our analysis shows that implementation of resource efficiency may have rebound effects. As shown in Figures 1 and 2, we find a positive correlation between efficiency improvements and rebound effects for both material and energy consumption. Besides, we also find that while energy efficiency scores are relatively higher, material efficiency performances are lower, but improving over the years. The rebound effects of energy efficiency exceed those of material efficiency, implying that energy reduction potentials are largely offset.

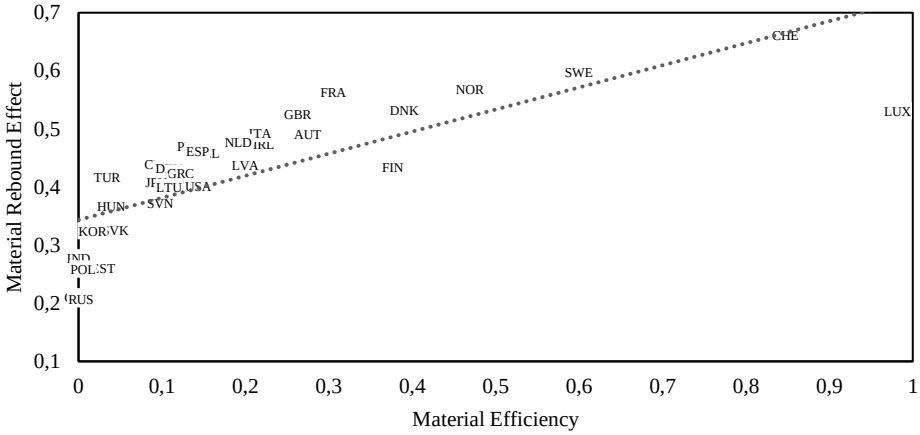

Figure 1. Material efficiency and the rebound effect

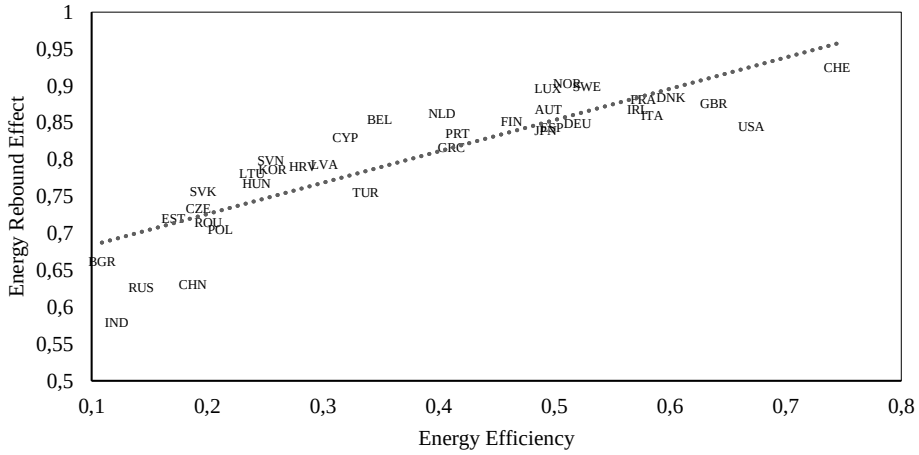

Figure 2. Energy efficiency and the rebound effect

DISCUSSION / POLICY IMPLICATIONS

First, concentrating on the key determining factors of material consumption may have a greater impact on attempts to reduce material demand. Second, due to the higher variation in material efficiency among countries, when the appropriate policies are put in place, low-scoring countries have a great deal of room to improve their material efficiency. Besides, the EU's CBAM will have an important impact on trading partners with poor efficiency scores in terms of energy and material and less strict climate policies, like Turkey, China, India, and Russia. These countries may have some difficulty adopting new regulations and will be forced to take serious actions to increase their material and energy efficiency performances. Third, the EU and partner countries should pay special attention to material efficiency improvements and further develop convenient policies and measures to tackle the rebound effect issue for both energy and material. This is because rebound effects, especially in high-income countries, can cancel out some of the benefits of resource efficiency increases. Overall, these findings suggest that targeting material consumption to improve environmental sustainability could be an important policy option as there is still significant potential to improve material efficiency due to the relatively low rebound effects and increasing material efficiency trend.

CONCLUSION

Improving energy and material efficiency is essential for achieving sustainable development, energy security, and climate goals. These improvements could, however, have a rebound effect that would cancel out any potential resource savings mainly driven by the increased resource efficiency. In this study, in order to simultaneously measure resource efficiency and the rebound effect based on their potential determinants, we estimate and analyze material and energy efficiency scores as well as rebound effects for the EU member countries and their trading partners in the context of sustainability and climate change using the SFA. This study contributes to the literature by highlighting the complex relationships between material and energy efficiency and by revealing potential rebound effects that may result from their implementation. The empirical outcomes of the paper are presented in a comparative manner using energy and material models to help policymakers determine the best action plans for lowering energy and material use while minimizing any rebound effects.

KEYWORDS

Material efficiency, Energy efficiency, Rebound effects, Stochastic frontier analysis, The EU member countries

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THE DIGITAL PATHWAY TO SUSTAINABLE DEVELOPMENT: THE ROLE OF ICT SKILLS

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INTRODUCTION

In the era of digital transformation, Information and Communications Technology (ICT) skills have emerged as a pivotal factor in achieving the United Nations Sustainable Development Goals (SDGs), underpinning progress across multiple dimensions of sustainable development, from economic growth and social inclusion to environmental sustainability. This article examines the critical function that digital literacy plays in achieving sustainable development, with a particular emphasis on Serbia as the case study. We examine the improvement in ICT skills in Serbia over the period of 2007-2021 using data from the Statistical Office of the Republic of Serbia, and we discuss the implications for sustainable development.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Goal 9 of the 17 SDGs emphasizes industry, innovation, and infrastructure, with sub-goal 9c highlighting the importance of universal access to ICTs and the Internet, especially in underdeveloped and developing countries (Hoz-Rosales et al., 2019; Mhlanga, 2021). Appiah-Otoo & Song (2021) stated that while over 80% of the population in developed countries have Internet access and the necessary ICT skills, less than 35% in developing countries can claim the same. This digital skills gap, a significant aspect of the digital divide, hinders the achievement of universal ICT proficiency, thereby limiting the potential of ICTs for economic growth, social development, and sustainable progress in these countries Bradshaw, Fallon & Viterna, 2005.

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METHODOLOGY

Based on data from the Statistical Office of the Republic of Serbia "The Usage of Information and Communication Technology on Individuals/households in the Republic of Serbia", this study employs a methodological framework developed by the EC DG CONNECT group to assess the proficiency of Serbian individuals in ICT skills (EC, 2014). The comprehensive Digital Skills Indicator (DSI) is divided into four sub-sections – Information Skills, Communication Skills, Problem Solving Skills which contains Problem Solving and Familiarity with Online Services, and Skills for Content Manipulation – Basic and Advanced. The analysis focused on the progression of ICT skills across various sub-categories during the time frame spanning from 2007 to 2021. It is important to notice that the utilization of DSI commenced in 2015, necessitating the reconstruction of indices for preceding years, resulting in the acquisition of approximate values. It is posited that, notwithstanding this, a discernible pattern can be observed.

RESULTS

During the observed period, there was a noteworthy enhancement in the level of Information Skills among the population of Serbia, particularly during the period from 2012 to 2014. Nevertheless, there continues to be a discrepancy between Serbia and the EU, specifically regarding advanced skills. The significance of Information skills has garnered increased attention in recent years, especially in light of the Covid-19 pandemic. The enhancement of Communication skills has exhibited a noteworthy progression, as there has been a substantial rise in the population of individuals with advanced proficiency in this domain. However, a concerning percentage of the population in Serbia continues to exhibit deficiencies in fundamental communication abilities. Notwithstanding these advancements, Serbian citizens continue to exhibit a comparative deficiency in problem-solving skills and content manipulation abilities compared to their European Union counterparts.

DISCUSSION / POLICY IMPLICATIONS

Enhancing ICT proficiency in Serbia holds significant implications for the promotion of sustainable development. By addressing one of the subsidiary objectives of sustainable development, which promotes equitable utilization of ICT and unrestricted access to the Internet, a substantial reduction in the digital divide can be achieved. This reduction in disparity plays a crucial role in fostering economic progress, enhancing productivity, and facilitating social integration. In the context of Serbia as a developing country, it is evident that further endeavors are

imperative to ensure equitable distribution of ICT, as well as to align the advancement of ICT skills and competencies with the objectives outlined in the SDGs. Policymakers should establish a comprehensive framework that encompasses the enhancement of overall knowledge in this domain. This can be achieved through formal and informal educational channels and lifelong learning initiatives. The ultimate objective of such measures should be to ensure that every individual is adequately equipped, and no one is excluded from benefiting.

CONCLUSION

The stated goals of sustainable development can only be accomplished by developing the framework that supports the use of ICT and the development of skills in all areas of society, which contributes to its overall progress. The present study highlights a favorable trajectory in the enhancement of skills, while also identifying certain deficiencies specific to Serbia. Moreover, it serves as a preliminary investigation that paves the way for future research endeavors exploring the influence of skills on sustainable development.

KEYWORDS

ICT, SDG, ICT skills, Serbia

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INNOVATION STRATEGIES FOR IMPROVING ENVIRONMENTAL ASPECTS OF ENERGY EFFICIENCY

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INTRODUCTION

Environmental policies require companies to incorporate environmental protection issues into their business strategies. Although innovation plays a crucial role in decreasing energy consumption and emissions within the industrial sector, its effects on other sectors can vary significantly (Li & Solaymani, 2021). This study aims to determine and assess the benefits of implementing the Energy efficiency Law of the Republic of Serbia in the construction sector with the aim to ensure their interests during the implementation of energy efficiency measures that are obligatory in the designing process.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Buildings exhibit durability, so decisions regarding construction and architecture carry long-term ramifications concerning the environment and energy consumption (Ryghaug & Sørensen, 2009). Defining innovation in the construction industry is challenging because it involves various disciplines and activities. It is a diverse and decentralized field, often characterized by fragmentation, which complicates the understanding of innovation within it (Orstavik et al., 2015).

METHODOLOGY

The survey on environmental protection is conducted as a part of the questionnaire that investigated all aspects of sustainable architecture. It was sent to 105 firms with a response rate of 71.2%, gained from September to December 2020 (Ružičić

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et al., 2021). Environmental protection was taken as a part of implementing energy efficiency strategies in the construction sector. Since the obligation of issuing energy passports for buildings was required, constructors began to take care of the thermal properties of the buildings which led to a reduction of energy consumption (Table 1).

RESULTS

The respondents assessed the effects of introducing innovations in energy efficiency areas in the construction sector on a Likert scale (1 to 5). The results indicated that the introduction of innovations impacted reducing all indicators of environmental pollution, with the most significant effect being the reduction in energy consumption in construction companies in Serbia.

Table 1. Effects of introducing innovations in the field of energy efficiency

Benefits from innovation introduction	Mean
Reduction in material consumption	2.945
Reduction in energy consumption	3.192
Reduction of emission of CO_2	3.055
Replacing existing materials/products with one that less pollutes the environment	3.096
Recycling of wastewater or materials	2.849

Authors calculations.

DISCUSSION / POLICY IMPLICATIONS

According to European regulations Serbia has established a legal framework regarding energy efficiency progress and provided the conditions for implementing energy efficiency measures in buildings by introducing methodologies for determining energy performance and calculating heating requirements (Ružičić et al., 2021). This process accelerates the introduction of innovations regarding energy efficiency in the construction industry in Serbia. The conducted research has shown that there are a lot of benefits for environmental protection (Table 1).

CONCLUSION

The benefits for environmental protection of introducing innovations in energy efficiency (Table 1), hold great potential in fostering sustainable practices and mitigating the environmental impact.

The obligation of issuing energy passports as innovation in the construction industry significantly influenced on environmental aspects of energy efficiency and implementing all principles of sustainability allows the construction industry to reduce its environmental impact, improve resource efficiency, and create new economic opportunities.

KEYWORDS

Environmental protection, Energy efficiency, Innovation in construction industry

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ENERGY INTENSITY DECREASE – STILL A PRIVILEGE OF DEVELOPED COUNTRIES?

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INTRODUCTION

Energy intensity is one of main indicators of economy's efficiency. Also, it is one of key metrics when it comes to progress in resolving major 21st century's issues, i.e. global warming. Energy intensity globally has recorded a significant decrease since 1995, mostly due to technological change (Voigt et al., 2014), but the extent of this decrease is not the same among countries, e.g. OECD countries (Liddle, 2012). The aim of this paper is to address these differences between countries.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Energy intensity is affected by many factors (GDP per capita, renewable energy share in total energy consumption, population density, manufacturing share in GDP etc). Some authors identified GDP per capita as significant factor (Mahmood and Ahmad, 2018), while the others found the relatively weak effect (Filipović et al., 2015). Some researchers found that energy intensity decreasing rate slows by more than 30 percent after the level of per capita income reaches $5,000. (Deichmann et al., 2018).

METHODOLOGY

With purpose of identifying significant variables and their impact on energy density, we performed a balanced panel analysis by selecting a sample of 73 countries over period of 15 years (2004-2018, World Bank data). Six independent variables were chosen: GDP per capita, share of renewable energy in total energy consumption, population density, gross fixed capital formation (% of GDP), manufacturing share in GVA and medium and high technologies manufacturing as share in total manufacturing.

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RESULTS

The analysis results show that the largest negative impact on energy intensity has GDP per capita, confirming the earlier results, e.g. that a 1% rise in GDP per capita lead to a 0.62–0.78% fall in energy intensity (Zhou et al., 2021). The negative impact also comes from renewable energy share in energy consumption, while the positive one comes from manufacturing level. Population density didn't have a positive effect, like in some older analyses (Sadorsky, 2013).

DISCUSSION / POLICY IMPLICATIONS

Analysis shows the key driver of energy intensity decrease is the country GDP per capita level, meaning that developing countries have limited potential for energy intensity decrease, as they are unable for large investments in green technologies. Another key result is the importance of renewable energy, pointing the significance of active energy RD&D policies (Balsalobre et al., 2015), as green innovation has a positive impact in majority of industries (Wurlod and Noailly, 2018).

CONCLUSION

Energy intensity is one of key metrics for overall economy efficiency. It is of great importance for green transition goals. Over last 20 years, World energy intensity has significantly decreased. However, the speed of decrease defers between countries. We performed a panel analysis, identifying GDP per capita as the main factor of energy intensity decrease. Developed countries have more possibilities for reducing energy intensity, as they can provide higher investments in green technologies.

KEYWORDS

Energy intensity, Renewable energy, Global warming, Green transition

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‘GREEN’ ENERGY IN ‘RED’ YUGOSLAVIA: THE FAILURE OF RENEWABLE ENERGY IN YUGOSLAVIA BETWEEN THE 1960S AND 1980S

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INTRODUCTION

This research focuses on the positive and negative experiences with renewable energy in socialist Yugoslavia. The fact that the country produced at times up to 70 percent of its electricity for industry and households in the hydroelectric power plants is an admirable achievement from the perspective of the contemporary push for Green Transition in the energy sector. However, the experiences were catastrophic at times, ranging from blackouts in the cities to production stoppages in industry.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The existing Serbian or regional scholarship has not yet analyzed this topic except from technological or engineering perspectives. Starting from that point, this research aims to provide an overarching analysis from a historical perspective of the gradual evolution and ultimate failure of the Yugoslav energy policies based on hydroelectric power, focusing on continuous problems in the supply of electricity and solutions found to navigate them.

METHODOLOGY

This research employs a critique of the sources as a standard historical method. It is based on a combination of primary and secondary sources, stretching from official Yugoslav policies and statistics, expert analyses, newspaper articles, and interviews with former engineers and other agents involved in the process.

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RESULTS

The expected results will provide a deep understanding of the Yugoslav experiences with hydroelectric power plants as the dominant source of electric energy that are important in regional and global contexts. These will include the overview and historical reconstruction of the entire process and a critical investigation of the problems and adaptations of official Yugoslav public policies that could be used as a starting point in the formulation of contemporary public policies in the field.

DISCUSSION / POLICY IMPLICATIONS

Previous experiences with electricity production in hydroelectric power plants or other renewable sources of energy are crucial in adequately approaching the Green Transition process that includes the expansion of hydroelectric power plant networks as renewable energy sources, which is and will most certainly be one of the pressing agendas in the future.

CONCLUSION

Transition to renewable energy, whether from hydro, solar, wind, or geothermal sources, faces a challenge in providing a continuous flow of energy to industry and households at the current level of technological capabilities. Lacking capacities for storage of vast amounts of electric energy, the solutions to this challenge will have to be found in conventional sources, among which nuclear power currently seems to be the best option, despite other environmental and safety concerns it raises.

KEYWORDS

Yugoslavia, hydroelectric power, renewable energy

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A COUNTRY RISK ASSESSMENT FRAMEWORK WITH INTERDEPENDENCIES BETWEEN DIFFERENT RISK DIMENSIONS

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INTRODUCTION

The assessment of a country's risk is considered a significant instrument in decision-making processes about investments, risk management and the allocation of resources. Considerations of a country's risk profile are necessary when entering foreign markets, due to certain unpredictable factors associated with conducting business in a specific country (for instance, civil unrest, political stability or economic conditions).

LITERATURE REVIEW / THEORETICAL BACKGROUND

Among the first to consider the necessity of defining the concept of country risk was Robock (1971). Negative events, such as crises, bubbles and panics, lead to changes in the measurement methods of risk. Scholars gave various definitions to country risk (Robock, 1971; Haendel et al., 1975; Meldrum, 2000; Deceanu et al.,

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2010). Gautrieaud (2002), Yao et al. (2006), and Martin (2010) argued that country risk represents a set of political decisions, sovereign actions and economic and financial risks.

METHODOLOGY

To describe the connections between the risk dimensions, such as social, labour, legal and environmental risks, we employ the generalized structure component analysis (GSCA) on a set of 120 developed, emerging and frontier countries. The robustness of the results was tested in two manners. First, we involve a partial least squares multi-group analysis (PLS-MGA), and then we assessed the effects of variable changes by replacing the legal risks latent variable with a broader one.

RESULTS

Our findings reveal that risk dimensions are interconnected at the country level and that such mutual dependencies should be taken into account for country risk assessment.

There is a two-fold contribution to the current literature: 1. our model assesses the potential connections and causality between the risk dimensions for a set of 120 developed, emerging and frontier countries; and 2. we involved in our study the environmental risks which represent a topic of emerging interest nowadays.

DISCUSSION / POLICY IMPLICATIONS

The study has implications for the design of public policies meant to ensure macroeconomic and social stability. Therefore, there should be implemented a proper strategy of communication and explanation of public policy measures. Moreover, a unified public policies' framework should be considered in tackling the country's risk issues.

CONCLUSION

Country risk assessment is a complex topic that caught and grabbed the attention of researchers, especially after the past financial crises. Due to its inherent complexity, it is quite difficult to build an assessment indicator system and to set index weights to measure country risk. However, the literature recommends certain methods, including the Generalized Structure Component Analysis (GSCA) that we employ to describe the relationships between four different country risk dimensions.

KEYWORDS

Country risk assessment, Risk dimensions, Generalized structure component analysis, Latent variables, PLS-MGA

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THE ROLE OF WASTE IN THE LINEAR AND/OR CIRCULAR ECONOMY MODEL

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INTRODUCTION

The basic hypothesis on which the author based the paper is that the linear model of the economy has caused a lot of damage to the living environment and that it is high time to move from theory to practice with more intensive forms of the circular economy. The derived hypothesis is that the "life cycle" of waste is much shorter in the linear economic model than in the circular economic model.

LITERATURE REVIEW

The increase in the world's population, accompanied by an increase in the volume of production, results in an increase in waste and negative externalities for the environment (Russel, 2009). However, waste that is used appropriately, as a raw material in a new production process, reduces raw material consumption and reduces externalities (Lacy & Rutqvist, 2015), directly affecting GDP growth, especially in transition economies (Mitić et al., 2017). The optimal answer for the mentioned problems is to replace the linear economic model with a circular economic model (Munitlak Ivanović, 2019).

METHODOLOGY

The work was mainly done using the desk-search method, analysing of available modern literature, the comparison of previously obtained results, the method of description, analysis and synthesis with the use of schematic representations.

RESULTS

The possibility of replacing the linear model with a circular one will evaluate the waste management system and management. The circular model is "circular" in

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shape because there is a feedback loop between the output and the input. This production model supports the circular movements characteristic of processes in nature (Munitlak Ivanović, 2019).

DISCUSSION

The linear model of production was in mass use during the 20th century. The possibility of replacing this form of economy with a circular one is not always suitable, because if the waste is dangerous, there is no possibility of applying the circular model of production. The duration of "waste" has a shorter lifetime in the linear model than in the circular model.

CONCLUSION

The analysis of case studies showed that economic entities practicing circular economy achieve savings in costs in the form of a reduced amount of waste (garbage, energy residuals, clean air). On the other hand, starting a new production process requires less input and energy because part of the output from the previous production cycle is the input for the new production cycle. This means that in the circular economy, fewer inputs are consumed and less undesirable residues remain after production.

KEYWORDS

Circular production model, Linear production model, Waste, Input, Output

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IMPLEMENTATING CIRCULAR ECONOMY POLICY IN "CYCLE" ENTERPISE

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INTRODUCTION

CYCLE an ISRAELI innovative enterprise aims at answering variety of environmental, health, pollution, economical cost of landfill and public spaces damages problems caused by construction and demolition wastes (CDW) which are not controlled locally or nationally. In order to achieve sustainability, quality of life for human beings.

Israel expects to double its population size from 9.7 million in 2023 to 19 million in 2048 celebrating 100 years. Building momentum, urban regeneration and roads infrastructure generate huge amount of CDW quantities.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The concept of circular economy (CE) goes from restorative to regenerative to create a life-long sustainability. Our environment has a limited amount of resources and not always what we spend we return back to keep the equilibrium. Buildings and the manner we design construct and maintain them have been significant contributors to the climate crisis the global population is witnessing including Israel. Consequently, to keep a sustained environment we are committed "to do more good than less bad" (Brown et al., 2016:47). Huge literature exists on CDW trying to describe, explain and guide all sectors to use its principles for the global benefits (European Commission, 2008; Eco Finance, 2020; Ellen MacAtrhur, 2015).

METHODOLOGY

A deep long research had been done to learn the Israeli nationally level of economy, building sectors, stakeholders Ministries engagement, civic organizations, future building predictions, quarrying and mining of raw materials available for use,

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population growth. Besides, experiments with new building materials at the Center for Building Research Technion Haifa.

Three main principle methods are in use by CYCLE: The CE philosophy as was developed along the years globally; the UN Sustainability Development Goals and the Doughnut Economy created by Kate Raworth.

RESULTS

CE bring many positive results: less landfills, more cleaned and attractive open spaces, people rising awareness to prevent environmental damages and negative impacts on human beings health, environmental citizenship is seen more embedded.

There is still great conflicts among those who call for decreasing green housing emission caused by using fossils and those who at their cost-benefits.

DISCUSSION / POLICY IMPLICATIONS

Circular economy is still a young experiment and under continuous research and many sectors on industry and non-industrial. There is a growing acquaintance that CE is one of the most important way to keep our Earth resources and let next generations to enjoy from the fruits we leave in raw materials and innovative products.

Israel tries to institutionalize regulations and laws (such as the 2021 Law fixing green building only) on locally and nationally scales some are successful and others still fail to achieve their goals.

CONCLUSION

CYCLE enterprise is an example how to establish the most closer and adjacent solution for construction and demolition waste on national scale. Cycle has a commitment to find the most innovative and available technologies to become a global example for teaching, sharing knowledge, research and educational center.

KEYWORDS

Circular economy, Construction and demolition waste, Climate change, Environmental damages, Sustainability

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EXPLORING PERSPECTIVES ON THE CIRCULAR ECONOMY: A REVIEW OF KEY SOURCES AND INSIGHTS

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INTRODUCTION

The circular economy is an economic model focusing on sustainable resource use and waste reduction. It is essential for a sustainable future by preserving natural resources, preventing resource depletion, reducing waste generation, reducing environmental pollution, promoting economic growth and employment opportunities, and encouraging innovation and sustainable technologies. A circular economy focuses on waste management, energy recovery, product longevity, recyclability, and resource efficiency through sharing and collaborative consumption.

The circular economy originated from waste management and recycling practises, as people recognised the importance of reusing resources and reducing waste. The Ancient Roman Empire's recycling practises, such as melting bronze statues, influenced the Industrial Revolution, which led to resource depletion and increased concerns about sustainability.

The circular economy gained importance in the late 20th century due to environmental awareness and resource conservation efforts. Recycling facilities and waste management practises were developed, and today, many countries and companies adopt circular economy principles to achieve sustainability goals. This approach emphasises resource efficiency, waste reduction, recycling promotion, and increased reuse. In this study, some important sources that provide in-depth information on the circular economy and offer different perspectives will be examined.

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LITERATURE REVIEW/THEORETICAL BACKGROUND

In this study's context, Biomimicry: Innovation Inspired by Nature Cradle to Cradle: Remaking the Way We Make Things, Designing for the Circular Economy, "Products That Last, The Circular Economy and the Global South: Sustainable Lifestyles and Green Industrial Development, The Circular Economy: Case Studies about the Transition from the Linear Economy, The Circular Economy: A User's Guide, The Circular Economy: A Wealth of Flows The Future of Packaging: From Linear to Circular Thinking in Systems: A Primer, Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist, Waste to Wealth: The Circular Economy Advantage, Circular Economy: The Concept and its Limitations, Circular Economy Rebound, Towards a consensus on the Circular Economy, The Circular Economy, Conceptualising the Circular Economy: An Analysis of 114 Definitions, The books Circular Economy: A New Sustainability Paradigm? and Circular Economy: From Review of Theories and Practises to Development of Implementation Tools have been selected.

METHODOLOGY

The methodology of this study is a literature review and book review. For the articles, the most cited articles in Google Academic were selected.

RESULTS

This study comprehensively examines the circular economy through various sources, including books like "Cradle to Cradle" and "Waste to Wealth." It aims to enhance understanding and awareness of the circular economy, its principles, strategies, and benefits in achieving sustainability objectives. The research delves into multiple perspectives to provide a comprehensive analysis of this economic model.

DISCUSSION

The roots of the circular economy can be traced back to historical periods when societies recognised the significance of waste management and recycling. Ancient civilizations like the Roman Empire practised recycling, but the Industrial Revolution led to resource depletion. In the 20th century, environmental awareness boosted the circular economy. Efforts to conserve resources and reduce waste emerged through recycling facilities and waste management practises. Today, the circular economy is widely embraced, focusing on resource efficiency, waste reduction, recycling promotion, and increased reuse.

CONCLUSION

The circular economy provides a promising framework to attain sustainability through the sustainable utilisation of resources and waste reduction. Embracing circular economy principles is imperative for the well-being of future generations. This economic model brings forth various advantages, such as safeguarding natural resources, preventing resource depletion, minimising waste production, reducing environmental pollution, fostering economic growth and employment prospects, and driving innovation and sustainable technologies. Transitioning to a circular economy necessitates the adoption of waste management practises that prioritise energy recovery, extending product lifespans, promoting recyclability and reusability, and maximising resource efficiency.

KEYWORDS

Circular economy, Sustainability, Waste management, Resource efficiency, Environmental awareness

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THE IMPACT OF CLIMATE CHANGE ON NONPROFITS THEMSELVES: A REVIEW OF LITERATURE

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INTRODUCTION

It is clear that NGOs are dealing with the effects of climate change. A significant number of NGOs work in geographical regions and areas where drought and heat waves, floods and vector-borne diseases are most felt as a consequence of climate change. Climate policy is fragmented at the local level, even though climate change is experienced mostly at the local level, in some regions more than others (Maibach et al., 2008). Therefore, climate protection at the local level is a policy issue where different actors and groups seek to understand the problem and its solution and take measures (Orderud, 2011). Naturally, many NGOs may lack the internal capacity and expertise to address the challenges of climate change.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The studies conducted generally do not identify the impact of climate change on NGOs. However, researchers (Chandrasekhar et al., 2022) have focused on certain aspects that are the result of the effects of climate change. Chandrasekhar et al. al., (2022) examined the importance of NGO involvement in disaster recovery planning. According to the researchers, natural disasters affect the capacity of organizations because the scale of NGO activity increases dramatically in such disasters. Studies have found that competition between large and small environmental NGOs is growing, as the small ones are being pushed out, the influence of the larger ones is increasing due to the lack of capacity, knowledge and experience of the smaller ones (Maibach et al., 2008; Allan, 2018). During the previous research, it was found

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that organizations that experienced at least some impact of natural disasters changed their service provision. Continuing, it is possible to note the research on climate migrants, with which NGOs find themselves on the front line, and as research indicates that doing nothing in this area also has its price (Baldwin et al., 2014).

METHODOLOGY

For methodological justification, we will use the theory of structural integration formulated by Galtung (1968). The researcher distinguished that one part of the theory consists of such a condition for integration as integration of actor-integration. This condition is based on two models: (i) a similarity model in which we assume that similarities between NGOs increase. Since climate change is a global problem, it can be said that there is a harmonization of legal acts regulating the activities of NGOs taking into account the prevailing climate change mitigation measures; (ii) the interdependence model shows that the dependence between NGOs is growing and NGOs are integrated to the extent that they are related to each other, this means that what negatively affects one NGO negatively affects another and what is beneficial to one is also beneficial to others.

The overall research question guiding this project can be formulated as follows: How and to what extent do non-governmental organizations identify the impacts of climate change on their activities, what kind of impacts are these and how do they affect participatory governance?

RESULTS

Climate change directly and indirectly affects human health. Health care NGOs can be drivers and sources of information on climate change (Chadwick, 2017). Like public sector hospitals, healthcare NGOs are likely to be forced to save energy due to the impact of climate change, although it is also important for them to provide services 24 hours 365 days a year (Nematchoua et al., 2019). NGOs that operate globally and have better funding can locate in green equipped buildings. Therefore, naturally climate change acts to be environmentally friendly (Nematchoua et al., 2019). NGOs representing a certain political ideology are differently engaged in climate change. Those with a more liberal view advocate more concern about climate change, but conservative ideologies show less concern (Bulla et al., 2017; Chadwick, 2017). Women representing NGOs are more engaged in climate change than men, suggesting that gender affects engagement in climate change (Chadwick, 2017). Research on employee attitudes in public sector organizations has shown that those employees who have a better understanding of climate change may be

more likely to express concern and be motivated to take adaptation actions (Bulla et al., 2017).

DISCUSSION / POLICY IMPLICATIONS

The research will reveal new ways to identify and implement practical, local, adaptive responses that are contextually relevant to climate change impact assessments for NGOs. The analysis of scientific literature and documents of international organizations and non-governmental organizations will be applied.

CONCLUSION

1. NGOs feel direct and indirect impact from the Climate change
2. They react resiliently
3. Adaptation vs mitigation
4. Increased networking, governance and inclusion of indigenous and vulnerable community members

KEYWORDS

Non-governmental organizations, Climate change, Adaptation, Impact, Participatory governance

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INFLUENCE OF SOCIO-ECONOMIC CONDITIONS ON CLIMATE CHANGES IN THE OHRID-PRESPA REGION IN THE REPUBLIC NORTH MACEDONIA

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INTRODUCTION

This research paper is based on the study for the Ohrid-Prespa region which aims to determine the socio-economic situation of the region given in consideration the climate change specifications. The study is organized in 7 different parts each containing a specific part of socio-economic analysis. For the purpose of this paper the emphasis is on the forecast part of the study which shows the probable forecast on the industry capacity for the region and GDP growth rate according to two different climate scenarios – the RCP2.6 and RCP8.6 – for future greenhouse gas concentrations for the period until 2100.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Since this abstract is a derivative of a larger case study, a large scope of data of many international organizations, such as UN agencies (The Intergovernmental Panel on Climate Change /IPCC[3], UNESKO, others), NASA, World Bank, WTO, OECD, Key EU laws and policies, and domestic and many others institution were consulted. Furthermore, the importance of climate change and its effects on socio-economic wellbeing of the population are highlighted by Abdallah and Stoll (2012); Szirmai (2015); Haughtonand and Khandker (2009); Roy et al. (2018).

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METHODOLOGY

The methodology is quantitative, and it is based on the forecast model developed according to the historical data and according to these selected presumptions:

- GDP growth rate logarithmic trend line from the period 2010-2021
- Number of enterprises trend logarithmic line from the period 2010-2021
- Projections of population number in the region according to the UN population data till 2100
- Changes in basic climate variables: daily temperature and daily precipitation according to the RCP2.6 and RCP8.6 scenarios for future greenhouse gas concentrations defined by the Fifth Intergovernmental Panel on Climate Change (IPCC) for the period until 2100.

This forecast does not take into consideration any other variables and gives the presumption that no other factors will change in the given period, i.e., ceteris paribus. Also, another forecast is made taking into consideration the SSP scenarios that respond to the RCP scenarios taken into consideration.

RESULTS

The forecast results show declining trends of the forecasted indicators. This can be expected because of several factors. The fall in population due to changes in the birth rate of the region, migrations, and climate change induced migrations also influence the fall of the two separate indicators. Fall in populations means fewer possible employees and therefore fewer enterprises in the years to come. This also influences the region's GDP growth rate, which will also fall due to the stated reasons. Third and the last reason for the decline of the indicators stated in this forecast is climate change.

DISCUSSION / POLICY IMPLICATIONS

Rise in temperature and change in climate can really affect the region given that the biggest industry sectors are sensitive to climate changes. Furthermore, the region lacks basic infrastructure to support the existing industries, yet alone support new ones, or build resilience towards climate change perspectives. Lack of sufficient road infrastructure, lack of sustainable energy and touristic capacities are all reasons, which could see the slow but immanent downfall of the region. This will further add pressure to the socio-economic conditions that the resident population is facing currently, leading to more migration and more stagnation for the region in the future.

CONCLUSION

The analysis of the different climate change scenarios for the region show that the average annual temperature will increase by 1.0°C by 2025 and 1.9°C by 2050, while the average rainfall is projected to decrease by 3% and 5%. This poses a significant risk for the region particularly in terms of agricultural productivity and as a threat to the two lakes in these municipalities that are of key environmental and socio-economic importance.

KEYWORDS

Ohrid region, Climate change, Socio economic conditions, GDP, Population

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CIRCULAR THINKING: DRIVING ECONOMIC AND ENVIROMENTAL INNOVATION IN NORTH MACEDONIA

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INTRODUCTION

The circular economy concept has gained momentum as a new sustainability paradigm, with its potential to drive economic and environmental innovation. This research aims to investigate the current level of circular thinking adoption among businesses in North Macedonia and its impact on economic growth and environmental sustainability. The article combines a literature review of the strategic documents and empirical research on the business sector circular practices to provide a comprehensive understanding of circular thinking in the context of North Macedonia.

The introduction section provides an overview of the importance of circular thinking in driving economic development and promoting environmental innovation. It highlights the need for a systemic shift towards circular strategies and the potential benefits for North Macedonia.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The literature review section focuses on the definition and conceptualization of the circular economy. It draws on the work of Geissdoerfer et al. (2017) and Kirchherr et al. (2017) to provide a comprehensive understanding of the circular economy concept. It Includes a broader range of relevant studies and sources that provide a comprehensive understanding of the circular economy concept and its relevance to North Macedonia.

METHODOLOGY

The methodology section describes the approach used in the research, which includes both secondary data analysis from industry documents and primary research on the North Macedonian business environment, combination of

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document reviews and empirical research on the business sector in North Macedonia. The document reviews analyse strategic documents and policies related to circular thinking in the country. An investigation into the practical applications of circularity encompasses survey-based research and direct conversations with companies to examine their current endeavours, hurdles, and prospects.

RESULTS

In the results portion of this study, we illuminate the advantages of reasoning within North Macedonia's landscape. These positive outcomes cover economic growth via job creation, resource management improvement, waste decrease, and environmental protection. Moreover, the section addresses difficulties encountered, including deficient knowledge and rule shortcomings, along with the demand for better infrastructure based on the gathered data and performed analyses.

DISCUSSION / POLICY IMPLICATIONS

The discussion section emphasizes the significance of increasing knowledge and fostering favourable regulations for the implementors such as the business sector. Emphasizing the crucial partnership between government officials and corporate leaders to foster eco-friendly projects and fuel regional growth in North Macedonia. It will contribute towards how circular practices can align with national development goals and to the country's sustainable growth.

CONCLUSION

In conclusion, this study synthesizes the most vital aspects of the research, necessity for collaborative action from all parties involved to embrace circular approaches and capitalize on the potential advantages of circular thinking in North Macedonia. Moreover, it underlines the relevance of harmony in grasping the circular economy to maintain its continued achievement.

KEYWORDS

Circular thinking, Business sector, Economic growth, Environmental innovation, Resource management

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LOCAL POWERS AND CADASTRAL METHOD FOR THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS IN THE STATE OF BAHIA - BRAZIL

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INTRODUCTION

Decentralization in large countries, as in Brazil, brought a new method of more efficient management of local affairs concerning its population in their territories from the point of view of co-governance and participatory and deliberative democracy. Due to the scenario, the United Nations has promoted the Sustainable Development Goals (SDGs) initiative, which demands its implementation focus on the local level.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The involvement of local authorities in cadastral services would help legitimize and enhance the process. However, the theoretical model that suggests adding variables does not guarantee demographic inclusion, equal deliberation, or procedural transparency (Gastil, 2021). Meanwhile, digital platforms offer a solution by continuously updating participatory processes but face hurdles due to their usage by local authorities and the community (Bobbio, 2019).

METHODOLOGY

Participation, deliberation, and their effects on public policies indicate that Information and Communication Technologies (ICTs) contribute to legitimacy based on participatory processes (Przybylska, 2021). Local powers to non-governmental organizations, civil society, international agencies, and all kinds of expressions of

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organized society from the point of view of co-governance and participatory and deliberative democracy (Pateman, 2012). As a multipurpose cadastre model (Velasco, 2008).

RESULTS

The participation of citizens or local authorities in coordinating cadastral policies would positively affect the results of the SDGs. Local organizations are involved in processes carried out in an area they know much better than the government authorities themselves. The cadastre requires continuous updating, and this could be a form of participation that is not limited in time, in which local authorities are involved permanently.

DISCUSSION / POLICY IMPLICATIONS

Considering that Bahia is composed of 417 municipalities, it is critical to develop a pedagogical process of accompaniment to build "communities" understanding at the local level of coordination, encompassing standard metadata. For that, to create instruments of policy based on governance to promote citizenship and evidence to offer support from data to implement realist measures able to attend to the demands of the population and redress the territorial and socioeconomic inequality (Grin, 2019).

CONCLUSION

To analyze this context and enhance the tools to provide more consistency for policy-makers is essential to implement cadastral methods that organize the municipalities by the census to obtain the necessary data that form a source of information for new public policies in the cities, thus establishing a space for participatory deliberation that involves local authorities both in the cadastral organization and in the application support of the SDGs in the municipal territory.

KEYWORDS

Public policies, Municipalities, Local development, Latin America, SDGs.

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ENVIRONMENTAL AND ENERGY POLICIES IN SERBIA IN THE CONTEXT OF CHILD'S RIGHTS PROTECTION

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INTRODUCTION

Child's rights protection is closely interrelated with environmental conservation. Several aspects of child's rights depend on environment quality. The violation of environmental protection provisions may result in the violation of child's rights. Violation of child's rights through the violation of environmental provisions may occur not only through criminal offences against environment, but also through long-term application of environmental policies that are harmful for child's rights or do not take into consideration the needs and best interest of children.

LITERATURE REVIEW / THEORETICAL BACKGROUND

In this paper, child's rights and environmental protection are defined in accordance with relevant international legal documents ratified by the Republic of Serbia, Constitution of the Republic of Serbia and national legislation regulating the protection of child's rights on the one hand and environmental protection, on the other. Strategic documents from which the conclusions about public policies in the field of child's rights protection and environmental conservation are draws, are also analyzed in this paper, along with reports of relevant international and state bodies.

METHODOLOGY

Two methodological approaches are applied in this paper. Normative method is applied for the purpose of interpretation of relevant national and international legislation pertinent to child's rights protection and environmental conservation as well as on strategic documents setting directions and goals for future normative

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and practical steps in these areas. Qualitative study is applied on relevant reports with the aim to obtain the information about current courses in policies regarding these two areas in the Republic of Serbia as well as to identify key challenges in these fields.

RESULTS

The analysis of the aforementioned material is aimed at estimating whether child's rights are sufficiently taken into consideration in relevant legislative, strategic and policy documents dedicated to environmental protection in the Republic of Serbia. These findings are also compared with the data obtained from relevant reports describing current state of both – environmental and child's rights protection in Serbia.

DISCUSSION / POLICY IMPLICATIONS

The results of these analysis indicate that there are some serious concerns regarding the respects of child's rights in the context of environmental protection in Serbia. Based upon these findings, it may be assumed that child's rights are not given the sufficient amount of attention in documents regulating environmental protection and sustainable development in the Republic of Serbia. This particularly refers to children from marginalized groups living in substandard settlements.

CONCLUSION

Normative framework of the Republic of Serbia regulating the issue of environmental protection is harmonized with international standards, but actual policies and practice should be more adjusted to specific needs of children, as particularly vulnerable group. Similar to the concept of "child friendly justice" there seems to be the need for something that the authors of this paper would refer to as "child friendly ecology".

KEYWORDS

Child's rights, Environmental protection, International standards, Human rights, Ecology

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FOOTPRINTS OF LENDING AND BANK PERFORMANCE: INTERNATIONAL EVIDENCE FROM PANEL DATA

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INTRODUCTION & THEORETICAL BACKGROUND

Climate change and related risks have recently come to the forefront of economic research. Against this backdrop, one of the pending issues is to accurately measure the contributions of various sectors to transition risk (Daumas, 2023). One of the proxies adopted to quantify such risk is the industry's carbon footprint. Although this measure initially applied to the non-financial sector, now there are methodologies which allow to calculate the carbon footprint of bank loan portfolios.

The carbon footprints of loan portfolios allow to assess the extent to which banks reallocate credit resources from "brown" to "green" borrowers. Such credit reallocation has a profound impact on the bank performance, affecting risk and efficiency (Galán & Tan, 2022; Umar et al., 2021; Yin et al., 2021). In this study, we investigate how the carbon footprint of bank loans endogenously interacts with banking sector concentration, profitability and stability.

METHODOLOGY

The relationships among the four indicators are examined using panel local projections (LP), a convenient method proposed by Jordá (2005) to derive relationships among multiple variables in case of relatively short time series and model misspecification. Our analysis builds on a balanced panel of 37 countries and encompasses the period between 2010 and 2018. To our knowledge, this is the first study embedding the carbon footprint of banks with a set of bank performance indicators.

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RESULTS & POLICY IMPLICATIONS

We find that the number of relationships involving the carbon footprint of lending is limited. As regards their direction, they mostly run from the carbon footprint to the bank performance indicators, thereby suggesting that the extent to which banks reallocate credit resources from “brown” to “green” borrowers, or vice versa, influences bank performance in a non-negligible manner. Moreover, in case of some indicators, this influence is nonlinear.

From the policymaking perspective, our findings suggest that safeguarding financial stability in the advanced economies is a crucial factor to secure a successful shift towards a greater role of green credit worldwide and, eventually, towards a higher level of environmental sustainability. In this regard, specific macroprudential measures are to be considered, simultaneously taming systemic risk and creating incentives to finance “greener” firms, as suggested by D’Orazio and Popoyan (2019), Lamperti et al. (2021).

CONCLUSION

Overall, we find that carbon footprint of lending is mostly connected with bank risk measures. It weakly relates to banking sector concentration and appears totally unrelated to profitability. The carbon footprint produces a nonlinear effect on the NPL ratio and Z-score globally and in the EMEs. This effect can be amplified since the build-up of systemic risk worldwide as well as in advanced economies feeds the carbon footprint of lending.

KEYWORDS

Carbon footprint of bank loans, Banking sector concentration, NPL ratio, Z-score, Systemic risk

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IMPACT OF WASTEWATER-BASED ENVIRONMENTAL PERFORMANCE ON SERBIAN ENTERPRISES' PROFITABILITY

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INTRODUCTION

The key sources of water pollution in Serbia are untreated industrial and municipal wastewater. The paper aims to research the influence of the enterprise's environmental performance on its profitability from 2011 to 2020 in Serbia in the field of wastewater. We used the eco-efficiency (EE) indicator to determine environmental performance. Business opportunities are the main emphasis of eco-efficiency, which enables companies to become more profitable and environmentally conscious (Revollar et al., 2021).

LITERATURE REVIEW / THEORETICAL BACKGROUND

The majority of the literature refers to the eco-efficiency of wastewater in China. Existing literature has examined the eco-efficiency of urbanization, agriculture production, wastewater treatment plants, biogas production, national economic sectors, energy utilization, etc. (Hou et al., 2019). Many researchers used the Generalized Method of Moments (GMM) provided by Arellano and Bover (1995) to evaluate the efficiency of various production activities (Hou et al., 2019; Zhu et al., 2022; Zhou et al., 2020; Wang and Peng, 2021, Brahmana and Kontesa, 2021, Ahmad et al., 2021, etc.).

METHODOLOGY

Similar to Stevanovic et al. (2023), we also applied the GMM method, but with a difference that environmental data referred to the total water emissions from the National Register of Pollution Sources (SEPA, 2022). The total water emissions of

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the enterprise *i* for the period *t* divided by the total revenues of the enterprise *i* for the period *t* were used as a EE variable determination. The following GMM equation was estimated:

$$\mathrm{ROA}_{it} = \mathrm{C} + \beta_1 ROA_{it-1} + \beta_2 \mathrm{EE}_{it} + \beta_3 \mathrm{SIZE}_{it} + \beta_4 \mathrm{INTENSITY}_{it} + \varepsilon_{it} \qquad (1)$$

RESULTS

Return on Assets (ROA) is the dependent variable in this panel regression study. At the 1% level, the model independent variables' coefficients are all statistically significant. According to the model, ROA grows notably with every EE indicator increase, and ROA reduces if SIZE rises. Our findings imply there is no impact of INTENSITY on the profitability of enterprises. Since the Hansen's (1999) test is small enough and has an insignificant p-value, we can conclude that the model presented is accurate.

DISCUSSION / POLICY IMPLICATIONS

This study's results are in line with Sudha (2020), and Guenster et al. (2011). However, results do not concide with Galindo-Manrique et al. (2021), and Kamande and Lokina (2013). The policy implications can include adjusting the proper procedures and regulations and their implementation to reduce the negative consequences of wastewater on eco-efficiency. “Serbia has undertaken to build all municipal wastewater treatment plants for settlements with more than two thousand inhabitants by 2040” (Mitrović, 2021).

CONCLUSION

This research examines the impact of enterprise’s eco-efficiency on its profitability based on water pollutants in Serbia. To the authors' knowledge, no studies have looked at this relationship, particularly for Serbian wastewater. This study's primary limitations include focusing only on Serbian enterprises from the PRTR register throughout the studied period and their emissions of water pollutants. Future research can include the enterprises' eco-efficiency and profitability link based on wastewater in other countries or the relationship between eco-efficiency and income of selected Balkan countries.

KEYWORDS

Eco-efficiency, Enterprise profitability, Wastewater, GMM, Serbia

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AGRICULTURAL PRODUCTIVITY AND CARBON EMISSIONS IN EUROPE

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INTRODUCTION

Agriculture is one of the key common policy making areas of the EU. Common Agricultural Policy (CAP), as a welfare programme for the European farmers, was first put in the 1960. Since then, CAP has been the largest item in the EU budget for years, with substantial financial transfers to the agricultural sector. Today, CAP remains among the major expenditure items, accounting for 33.1% of the 2021 EU-27 budget. With the aim of ensuring a stable supply of affordable food, CAP seeks improvement in agricultural productivity. Practical outcomes of ambitious common agricultural policies implemented at the EU level, have attracted much academic interest. A number of studies devoted to assessment of agricultural productivity and convergence. Yet, traditional productivity measures ignore negative environmental impact of production. Agricultural activities often result in unintended social costs (externalities), such as loss of biodiversity, emission of GHGs, and loss of soil nutrients. Relying on market prices and quantities of agricultural goods produced in calculation of productivity measures, the literature on measurement of agricultural productivity ignored negative environmental impact of agricultural production.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Considerable research focused on assessment of agricultural productivity changes over the past few decades, revealing mixed results and remaining far from conclusive. In an extensive investigation of global agricultural productivity trends, Alston et al. (2010) pointed to slowing down in agricultural land and labour

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productivity in high income countries over the period 1990 - 2005. In contrast, research by Fuglie and Wang (2012) reported positive total factor productivity growth rates for West and Central Europe from 1961 to 2009. A number of research on agricultural productivity has been devoted to investigation of relative total productivity across nations (Galanapoulos et al., 2004; Ball et al., 2010; Rezitis, 2010; Swinnen and Vranken, 2010; Cechura et al., 2014; Barath and Ferto, 2017). Focusing particularly on 11 EU countries (Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, the Netherlands, Sweden and the UK) and the US between 1973 and 2002, Ball et al. (2010) found relatively higher TFP for US in comparison to 9 EU countries. Only Belgium and the Netherlands had higher levels of TFP compared to US 1973, where US caught up with both of them by the early 1990s. Employing more sophisticated econometric means to test convergence hypothesis, using the same dataset, Rezitis (2010) found wide variation in TFP growth rates across the countries in dataset and supporting evidence for β and long run convergence among sample countries. Extending the empirical analysis to include a wider set of EU members (EU15) together with candidate countries (12) over the period 1993-1999, Galanapoulos et al. (2004) conducted Malmquist Productivity Index estimates. Their findings indicate historically higher agricultural productivity rates for the EU member states compared to new comers, resulting a significant productivity gap. A recent study by Barath and Ferto (2017) reinvestigated relative productivity levels for 23 EU member states between 2004 – 2013. They reported evidence of TFP convergence among member states.

METHODOLOGY

Drawing on methodology proposed by Chung et al. (1997), the objective of this study is to investigate agricultural productivity differences and convergence across Europe, accounting for unwanted by-products – GHGs. Agricultural productivity of 26 EU member states and Türkiye assessed utilising Malmquist – Luenberger Productivity Index, for the years 2002 - 2020. In addition, β-, σ-, stochastic convergence tested, employing cross – section and time series approaches. The input and output data are from FAO Statistical database (FAOSTAT, 2023). GHGs data are gathered from Climate Watch historical GHG database (Climate Watch, 2023). Output variable, agricultural produce, represents good output. Bad output variable is agricultural GHGs measured in metric tonnes. Input variables are agricultural land, agricultural labour, fertilisers and agricultural capital.

RESULTS

Preliminary findings indicate long run convergence, and presence of catching-up in agricultural productivity among countries.

CONCLUSION

The study aims to contribute to the literature at least two important ways. First, employing an environmentally sensitive productivity index, we account for undesirable outcome of agricultural production. To the best of our knowledge, this is to be the first research on assessment of European agricultural productivity, incorporating negative effect of environmentally harmful by-products. Second, existing research remains limited in terms of both country and time dimensions of the dataset utilised. This study extends the analysis to 26 member states and Türkiye, over a longer period of time (2002 – 2020). Given the existing differences in terms of resource endowments between the old member states and the new member states, we expect to reveal patterns of agricultural productivity development across member states.

KEYWORDS

GHG, Malmquist-Luenberger Productivity Index

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URBAN TRAVEL BEHAVIOUR AND SUSTAINABILITY: A NEW CULTURE FOR LONG-TERM SOLUTIONS

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INTRODUCTION

Sustainable transport is crucial for a higher quality of life in European urban areas and enables the reduction of negative externalities such as congestion, pollution and accidents. What is needed is a greater awareness of all travelers about the impact of their mobility choices as an essential element towards the new culture of urban mobility. But also, in order to promote an efficient behavior of road users, the availability of appropriate collective transport services and routes and of cycle and pedestrian paths are very important.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The idea is to supply knowledge tools in order to answer to specific needs of population and transport operator/policy-makers by changing the context in a way that can be perceived by final users. Broadly speaking, the approach used in this paper, and suggested to public administrators, is based on the "Theory Based Evaluation", by which actions to be proposed need to be part of the context to which they are referred to. The idea is to perceive ex ante possible effects of the suggested interventions and to supply appropriate answers to those who are asking for changes. A consistent literature review will be presented.

METHODOLOGY

In methodological terms, in this paper, consultation has been largely used because it allows, on one side, to acquire, with transparency, news, needs, problems and, on the other side, to compensate decision takers' information asymmetries. The use of push and pull measures is a priority and it could be successfully applied if coordinated and introduced at the same time as a mixed policy. Pull measures are tools for making public transport more attractive, while push measures use

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deterring or punishing tools to promote modal shift. The combination of these two different tools is the preferable solution.

In this paper a Random Utility Model (RUM) is used to measure and evaluate the willingness to use public transport. Results provide useful policy indications.

RESULTS

Empirical findings are that notwithstanding the existence of a weak transport urban service, people would be in favor of using buses in the future. Nevertheless, this shift towards public transport needs to be encouraged through appropriate policies, which could culminate in the achievement of greater sustainability; otherwise, we will most certainly have a difficult future. It is therefore necessary to promote the double-dividend aim which implies on one side a change of culture by the demand side in terms of transport mode selection, and on the other side to provide by decision-makers those tools which can affect these changes.

DISCUSSION / POLICY IMPLICATIONS

A new culture for urban mobility is needed. In the light of new exigencies, decision-makers should support sustainable mobility-related measures to meet people's expectations. In the long term, mobility patterns can change if there is a change in urban locations and in land-use patterns. An effort is required to include these aspects in regional and urban development planning. The planning should aim at maximizing the urban transport system efficiency by considering the environmental and the city resource constrains. Sustainable transportation systems require a dynamic balance between all the components of sustainable development, that is environmental protection, social equity and economic efficiency for current and future generations.

CONCLUSION

Results show how the key to overcome obstacles in applying new schemes can be found in the twin goals of economic tools: to increase efficiency and to generate revenues. It is essential to include these tools in a package of transport policy measures, which also includes investment in public transport network and services. So doing, it may be possible to shift public opinion in favor of public transport services. Therefore an effort is required to include these aspects in regional and urban development planning which aim at maximizing the urban transport system efficiency by considering the environmental and the city resource constrains.

KEYWORDS

Mobility, Sustainability, R.U.M., Travel Behaviour, Urban Development Planning.

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THE COMPATIBILITY OF ENVIRONMENTAL LICENSES WITH THE AMERICAN DECLARATION ON THE RIGHTS OF INDIGENOUS PEOPLE AND BRAZIL'S POLICY ON TERRITORIAL AND ENVIRONMENTAL MANAGEMENT OF INDIGENOUS LANDS

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INTRODUCTION

Brazilian indigenous tribes suffer with the exploitation of mineral resources in their territories, which goes against their human rights guaranteed nationally and internationally. It is justified by its economic gain, but it also negatively impacts the local culture and environment. Considering this, the PhD thesis studies how it is possible to reconcile the state, private, and social interests involved and where are the gaps that allow the disrespect of indigenous and environmental rights.

THEORETICAL BACKGROUND

The indigenous identity, built from knowledge and social relations, is strictly related to their land, which is a part of the native community (Santos Júnior, 2012). However, according to study by Almeida, Futada & Klein (2016), in 2016, almost 10% of the mining processes in the Brazilian Amazon fell on ¼ of these specially protected territories. Mining is the second largest source of income in the country (University of Harvard, 2022), what plays against the local sustainable development.

METHODOLOGY

It is adopted the deductive method, with an explanatory and descriptive narrative. Also, an analysis of specific cases on the processing of environmental licenses is carried out. For this purpose, secondary data has been collected mainly from bibliographic sources. Part of the information has been obtained at the Max Planck

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Institute in Heidelberg, Germany. The approach to the data collected is qualitative, to obtain a critical understanding about the indigenous and environmental issues.

RESULTS

Despite the importance of the indigenous rights and the tendency to theoretically reject the colonialist thinking, it is still perpetrated in practice. Instead of guaranteeing their equal partaking in the public decision-making space, what is seen is a verticalization in which this participation is a mere compliance with a procedural phase, instead of being a real concern with social and environmental rights. Thus, it benefits more the economic interests on their natural resources.

DISCUSSION

The Brazilian State should protect the social, environmental, and economic rights legally assumed, but this is not sustainably happening. To counteract the power of the mining companies and the state decisions that favor them, it is defended to concentrate efforts on local and regional action. Thus, it is important to strengthen the indigenous movement, through the organization of local leaders and the promotion of the participation of these groups in the processes that affect their rights.

CONCLUSION

Given the importance of indigenous territoriality and mining economic activity, they have become the subject of administrative and legal norms, both substantive and procedural, in the international scenario and in the Brazilian domestic context. However, this is not being respected in reality, when many of those groups are losing their way of living or are being forced to migrate because of mining in their lands. Because of that, it is important to study how this is being permitted to happen.

KEYWORDS

Indigenous tribes, Human rights, Environmental protection, Mining activities, Sustainable development

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JUST TRANSITION FROM THE LOCAL SOCIO-ECONOMIC DEVELOPMENT PERSPECTIVE – THE CASE OF 10 MUNICIPALITIES IN THE REPUBLIC OF SERBIA

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INTRODUCTION

As a full signatory of the Energy Community Treaty and Sofia Declaration on the Green Agenda for the Western Balkans, Serbia is committed to engage in phasing out coal-fired energy and reduce dependency on fossil fuels. The National Energy and Climate Plan (NECP) provides a legal basis for sustainable transition including financial resources and governance mechanisms. However, not all economic sectors, population groups and geographical regions are equally exposed. This research aims to assess to what extent ten selected municipalities, with a high mining sector dependance, prepared for the just transition process taking into account characteristics of the local economy.

LITERATURE REVIEW / THEORETICAL BACKGROUND

We particularly rely on empirical research contributions aimed at identifying critical factors of the local energy transition in the European context. Reviewed literature includes papers focusing on mitigation risks immanent to labour market transformation (Voicu-Dorobantu, 2021), socio-economic impact and governance (Pavloudakis et al., 2023; Moodie, 2021; Galgóczi, 2020), as well as experiences of the Central and Eastern Europe economies (Young & Macura, 2023; Nowakowska et al., 2021).

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METHODOLOGY

The research approach is mainly based on assessment of the economic, social and governance capacities of the selected ten municipalities selected with respect to the share of mining sector in the local gross value added and employment. Such empirical analyses were performed using available local statistics provided by the national statistics. The analysis was amended by the analysis of local economic potentials that could be used to minimize negative effects of the decarbonization.

RESULTS

Research results indicate severe exposure of the targeted municipalities to the negative consequences of decarbonization. The main risks refer to potential job losses in mining and energy sectors including sectors directly related to decarbonization, with potential adverse effects to the whole local economy. Municipalities with underdeveloped sectors of small and medium enterprises and ones with poor infrastructure could be seriously affected in terms of depopulation and brain drain.

DISCUSSION / POLICY IMPLICATIONS

Obtained results provide evidence for developing targeted interventions aimed at minimizing negative effects of the just transition process on local economies and vulnerable population. The focus of the policy measures should be on supporting upskilling and reskilling of the population employed in affected sectors, compensation policies as well as providing market-based mechanisms (eg. “Polluter pays principle”) and incentives to change their behavioral patterns such as switching to renewable energy sources.

CONCLUSION

Just transition process reflects Government’s strategic direction towards sustainable development. Serbia has already started paying the price of non-acting and further costs including unhealthy living environment and temporary imports of electricity are projected to rise in the future. The social component of just transition should not be neglected since development of the renewable energy sector might produce significant spillovers to other economic sectors and regions already facing issues such as lack of well-educated workforce.

KEYWORDS

Just Transition, Local Development, Sustainable Development, Governance, Serbia

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CHINA'S GREEN FINANCE DEVELOPMENT: PERSPECTIVES AND CHALLENGES

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INTRODUCTION

China's green finance has grown rapidly in recent years, while Chinese financial market decision-makers have taken the lead in expanding their responsibilities in developing a green financial system. Despite recent advancements, there are still many challenges China's green development faces. Moreover, green development is additionally challenged nowadays by the current global geopolitical changes. Considering that, the research is aimed to analyze the recent trends in green finance in China and investigate the main barriers, including their overcoming solutions.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Green development and green finance have become highly discussed topics in recent years, while a framework and definition for green finance have been established by certain scholars like Lindenberg (2014), Wang and Zhi (2016), Qin and Wang (2019), Hafner et al. (2020), Zhang et al. (2020), and others. According to Wang et al. (2021), China has become a major player in the fields of green finance and development, and its research output is only second after the US. Most scholars discovered that green financing has a positive impact on the environment in China (Li et al., 2022; Zhou et al., 2020; Sun et al., 2023; Lee & Lee, 2022; Muganyi et al., 2021) and aids in the shift from conventional to renewable energy use (Song et al., 2021; Wang et al., 2021). However, some main obstacles to the development of green financing in China continuously persist (Zhao et al., 2022; Ren et al., 2020).

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METHODOLOGY

This research focuses on the analysis of the recent trends in green finance in China, i.e., mapping out green finance policies that have been recently applied, green instruments that have been used, and challenges that China's green development faces. In addition, this research seeks to offer some perspectives on the following issues: 1) How might green finance contribute to sustainable development? 2) What are the policy recommendations for China's advancement of green finance? 3) How can the public and private sectors contribute to the promotion of green finance?

RESULTS

After initiating the green finance reform and launching the innovation pilot zone (GFPZ) policy (Zhang, 2023) in 2017, China has made tremendous strides in developing green finance. According to the Climate Bonds Initiative report (2023), the Chinese green bond market hit a record high of a total of USD 155 billion (RMB 1.0 trillion) in onshore and offshore labelled green bonds in 2022. An RMB 200 billion (USD 31 billion) re-lending program for clean coal was implemented by the People's Bank of China in November 2021, while a new re-lending scheme worth RMB 100 billion (around USD 15 billion) was announced in May 2022 with the aim "to support the clean and efficient use of coal" (Xinhua, 2022).

DISCUSSION / POLICY IMPLICATIONS

Despite recent advancements, there are still many challenges China's green development faces and much work to be done in order to establish a greener financial sector. Particularly, one of the key problems is that economic growth precedes environmental compliance, or, in other words, while insufficient environmental regulation implementation creates incentives for investing in polluting companies, the beneficial effects of green projects and the negative consequences of pollution have not yet been sufficiently capitalized to give an impetus for green investment. Furthermore, although the absolute growth of green finance appears to be significant, the share of green finance for green loans and bonds in the overall system shows slow progress.

CONCLUSION

To facilitate green finance and overcome the main barriers, the promotion of green insurance and other green financial products, as well as the strengthening of consistent regulation, is necessary. The establishment of a unified green bond

disclosure system, along with encouraging green consumption incentive mechanisms, could also contribute to the more pronounced development of the Chinese green financial system.

KEYWORDS

China, green finance, green development, green policy

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CARBON BORDER ADJUSTMENT MECHANISM EFFECTS ON THE WESTERN BALKAN COUNTRIES

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INTRODUCTION

Carbon Border Adjustment Mechanism (CBAM) is a new carbon tariff on energy-intensive products (cement, iron and steel, aluminum, electricity, fertilizers and hydrogen) imposed by the EU. In order to be exempt from CBAM tariffs, non-EU countries can introduce carbon pricing systems similar to the EU. As the EU is the main trading partner for Western Balkan (WB), the aim of the paper is to give an overview of CBAM and show exposure of CBAM sectors of WB countries affected by this tariff.

LITERATURE REVIEW / THEORETICAL BACKGROUND

A growing number of studies regarding CBAM have been done. They discuss a wide range of specific issues about CBAM, including legality (Lim et al., 2021; Trachtman, 2016), carbon leakage (Jakob, 2021), effects on the national economy (Acar et al., 2021), non-EU countries' opposition to CBAM (Overland & Sabyrbekov, 2022), etc. Also, special reports from international institutions like World Bank (2023a) and Energy Community (2023) have focused on CBAM effects in WB countries.

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METHODOLOGY

In order to conduct these study, several research questions were formulated and attempted to be answered: 1) Will and how will CBAM apllly to WB? 2) How much are CBAM sectors from WB countries exposed to new tariff measured by greenhouse gases (GHG) emission and value of export? A comparative analysis of WB countries by CBAM sectors was done in oredr to answer these questions. Data from the UN (2023), the World Bank (2023b) and Climatewatch (2023) was used for the period of 2018 to 2022.

RESULTS

The majority of CBAM products are exported to the EU. Some sectors, due to high GHG emissions and a greater level of export, may be more exposed, like the iron and steel industry in Serbia. Also, with the exception of Albania, electricity is still dominated by solid fuels and emits much more GHG than in the EU, making this sector vulnerable to CBAM and potential carbon pricing. Although all WB countries are considering carbon pricing, only Montenegro has introduced this system in 2020.

DISCUSSION / POLICY IMPLICATIONS

The findings correspond with research by Eicke et al. (2021), which indicates that Bosnia and Herzegovina and Serbia are quite exposed to CBAM. From a policy perspective, this analysis can provide evidence for the potential implementation of carbon pricing in line with EU regulation in order to be examined from CBAM; however, further analysis is needed regarding the capacity for monitoring GHG emissions and potential effects on inflation, especially during the energy and cost of living crises.

CONCLUSION

The study shows that CBAM will affect WB countries, mostly Bosnia and Herzegovina and Serbia. Individual sectors, such as iron and steel in Serbia, may be particularly affected, which would demand additional policies in order to mitigate the effect of CBAM. The electricity sector is still primarily based on fossil fuels, which makes these sectors exposed to CBAM. Carbon pricing can be a good way of mitigating the effect of CBAM and providing new revenue; however, further research is needed.

KEYWORDS

Carbon Border Adjustment Mechanism, Western Balkans, Carbone Pricing, Green Transition, Carbon Tariffs.

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SUSTAINABILITY REPORTING AND ESG PERFORMANCE OF THE SERBIAN REAL SECTOR

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INTRODUCTION

The aim of the paper is to analyze the complexity of national corporate reporting in accordance with sustainable development goals. Due to the growing awareness of the importance of environmental and social business dimensions, the paper investigates the transparency and the quality of disclosed ESG information in the most successful large-sized companies in Serbia. The paper's specific objective refers to the state analysis in the creation of unique globally accepted sustainability standards.

LITERATURE REVIEW / THEORETICAL BACKGROUND

The paper provides a review of domestic and foreign literature related to the sustainability reporting and qualitative and quantitative ESG information (Adams et al., 2022; Darnall et al., 2022, Berber et al., 2018). Besides, it is interesting to follow the activities of standardization and quality improvements in the area of sustainability (Malinić & Vučković Milutinović, 2023; Global Report Initiative, 2023; International Sustainability Standard Board, 2023; Sustainability Accounting Standards Board, 2023).

METHODOLOGY

Considering the defined goals, the paper includes desk research focused on the reporting of economic, environmental and social aspects of the Serbian real sector. The research methodology includes the content analysis of the management reports and sustainability reports of the large-sized companies that are included in the top 100 enterprises with the highest realized net profit. The analysis covers the reports for 2022 and was determined using data from the Register of Financial Statements of the Serbian Business Registers Agency.

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RESULTS

The results of the analysis indicate that a responsible attitude towards the environmental and society is an indispensable part of the business of analyzed companies. The majority of companies disclose information about sustainability (as a part of annual business report, separate publication or within group sustainability report). For most of the analyzed companies, it is characteristic that the sustainable reporting was not based on the unique internationally recognized methodology.

DISCUSSION / POLICY IMPLICATIONS

This paper contributes to the literature in the area of corporate sustainability reporting and ESG performance. Sustainability reporting has become one of the top priorities due to growing environmental, governance and social problems. The research results can be interest to readers in academic areas, but also to management of companies, financial analysts, policymakers and stakeholders.

CONCLUSION

There are significant differences between companies' sustainability reporting due to lack of clear regulations and unique standards regarding methodology, content and form of reports. In order to unify and improve non-financial reporting in Serbia, it is necessary to promote sustainability reporting as a desirable business practice, as well as harmonize the national legislative framework with international legislation and leading trends in this area.

KEYWORDS

Sustainability reporting, ESG information, Performance, Sustainability standards, Serbia

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WHAT ROLE DOES BOARD COMPOSITION PLAY IN ESG DISCLOSURE? EVIDENCE FROM V4 COUNTRIES

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INTRODUCTION

With climate change and environmental issues getting severe, environmental, social and governance (ESG) has received a great attention in recent years, it effectively assesses a company's capacity to operate sustainably and socially. The purpose of this study is to investigate the relationship between board composition, including gender diversity, board size, non-executive directors on the board and CEO duality, and ESG disclosure by public listed companies in the Visergrád Group (V4) countries.

LITERATURE REVIEW / THEORETICAL BACKGROUND

A company's ESG practices and disclosures benefit from effective corporate governance. (Albitar et al., 2020). ESG are considered as a corporate governance issue (Ying et al., 2021), the board of directors acts as a management oversight body, providing direct and indirect information to all stakeholders, and monitors management choices pertaining to sustainable development of internal management and the of society (Akisik & Gal, 2017; Chebbi & Ammer, 2022).

METHODOLOGY

To achieve the objective, Bloomberg's database was employed to collect ESG disclosure scores and financial data for publicly listed companies in the V4 countries, with a sample of 642 firm-year observations. Two-way random effect regression model is utilized to control for unobserved heterogeneity across the individuals, firms, and countries in the panel data, ESG disclosure served as the

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dependent variable, the four proxies of board composition were adopted as explanatory variables.

RESULTS

The regression analysis demonstrates a statistically significant and positive association between percentage of women on board and ESG disclosure, with a coefficient estimate of 0.258 (p-value < 0.01). It reveals a significant and positive relationship between board size and ESG disclosure, with a coefficient estimate of 1.407 (p-value < 0.01). However, it did not find a significant relationship between the percentage of non-executive directors on the board and CEO duality with ESG disclosure.

DISCUSSION / POLICY IMPLICATIONS

The results suggest that the presence of gender diversity on corporate boards can serve as a catalyst for greater transparency and disclosure regarding ESG issues. A greater representation of women on their boards views ESG disclosure as a critical component of broader sustainability strategy, and may be more willing to publicly report on their ESG practices. However, non-executive directors and CEO duality do not play a significant role in shaping companies' decisions to disclose ESG practices.

CONCLUSION

This study reveals a positive association between gender diversity and board size with ESG disclosure in the public listed companies in the V4 countries, provided valuable into sustainable business practices. However, there is no significant association between non-executive directors, CEO duality, and ESG disclosure, non-executive directors and CEO duality do not contribute to ESG disclosure in V4 countries. From the perspective of corporate governance, focusing on gender diversity and board size more helps to enhance corporate’s sustainability and align with global ESG standards.

KEYWORDS

Board composition, ESG disclosure, Visergrád Group, Gender diversity, Board size

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ONLINE SUSTAINABLE REPORTING PRACTICE IN HIGHER EDUCATION INSTITUTIONS IN SERBIA

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INTRODUCTION

Although sustainable reporting is primarily associated with corporate entities, its application is also relevant for higher education institutions (HEI). However, its implementation in the education sector is still in its initial phase. This paper aims to analyze the degree of application of sustainable reporting by HEI in Serbia, analyzing the University of Belgrade as it is ranked in the Shangai list among the 500 best universities in the world.

LITERATURE REVIEW / THEORETICAL BACKGROUND

HEI's sustainable reporting signifies a shift from solely providing education to actively addressing social, economic, and environmental challenges (Giesenbauer & Müller-Christ, 2020). According to Del Río Fernandez et al. (2022), their role no longer implies only focusing on academic excellence and knowledge dissemination but shapes the future generation that should comprehensively solve sustainability challenges that they inherited from previous generations that did not have such a comprehensive concept of education. In other words, sustainable reporting can be seen as a communication tool between HEI and different stakeholders (Moggi, 2019; Nicolò et al., 2023). One of the challenges in this process is the lack of awareness among HEIs regarding the advantages of reporting sustainability information (Sepasi et al., 2019).

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METHODOLOGY

To determine the level of application of online sustainable reporting by the University of Belgrade, the authors analyzed the universities website by employing a content analysis based on a comprehensive disclosure index (DI). The disclosure index was based on five main categories (Formal statement, Governance, Research on sustainability topics, Human rights issues, and Curriculum and teaching on sustainability topics) composed of 25 variables. The index was created as a combination of research done by Sepasi et al. (2019) and Nicolò et al. (2023), while some variables were modified due to the specifics of Serbian society. The index is calculated as follows:

$$DI=\frac{\sum_{i=1}^{n} d_i}{N}$$

where d = 1 if the item was disclosed and 0 otherwise; N = the maximum number of items (25 items).

RESULTS

The result implies that online sustainable reporting of the University of Belgrade is low and that the most disclosed variable relates to Formal statements. In other words, the universities website does not include topics related to sustainable practice.

DISCUSSION / POLICY IMPLICATIONS

Despite the findings suggesting a limited level of awareness regarding online sustainable reporting practices at the University of Belgrade, one contributing factor is that the responsibility for these activities lies with the University's members (faculties and institutes). The University has addressed this issue by granting faculties the autonomy to manage sustainable reporting in their respective acts. This is evident from the fact that when the term "sustainable" is searched on the University's website, it redirects to the faculties' websites where the term is mentioned.

CONCLUSION

Higher education institutions in Serbia are in the early stages of incorporating sustainability reporting into their operations. A crucial aspect of this process will be recognizing the disclosure process as a tool that can transform the position and role of these institutions. It relates to the fact that rather than solely focusing on

education, they should become catalysts for comprehensive education and push the boundaries of traditional educational practices.

KEYWORDS

Sustainable reporting, Higher education institutions, Serbia

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ENVIRONMENTAL PRESSURE AND PERFORMANCES OF SERBIAN AGRICULTURE COMPANIES

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INTRODUCTION

The need for agricultural products is increasing globally and nationally, but not without consequences for the ecosystem. The agricultural sector is essential for the Republic of Serbia because it ensures the nation's food security and constantly generates a significant share of the total GDP. The paper aims to study the quality of the Serbian agricultural environmental policies and the impact of the agricultural companies' environmental pressure on their profitability in 2011-2021.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Assessment of environmental efficiency is a useful measure to abate the environmental pressure caused by activities of agricultural companies while preserving their economic sustainability (Cecchini et al., 2023). Agricultural environmental efficiency is studied based on agricultural carbon emissions (Yang et al., 2022), greenhouse gases (Cecchini et al., 2023), sulfur oxides emissions (Stevanović et al., 2022), nitrogen oxides emissions (Minović & Stevanović, 2022), on the regional level (Coluccia et al., 2020). Agriculture efficiency is also analyzed for Chinese regions by Zhu et al. (2022) and for Serbian enterprises by Lukić et al. (2021).

METHODOLOGY

The quality of Serbian environmental policies needed to protect the environment is analyzed by the environmental performance index (EPI). The environmental pressure of 52 Serbian agricultural companies and its link with profitability is

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assessed by Dynamic Least Squares (DOLS), Fully Modified Least Squares (FMOLS), and Generalized Method of Moments (GMM) regression panel analysis in eleven years. Environmental performance indicators based on companies' air emissions and revenues are used to follow pollution trends, identify their drivers, and assess the environmental profitability link.

RESULTS

Serbia, with an EPI score of 45.3 on agriculture in 2021, was at 51st place among 180 countries in 2022 and eight in 2019. The Serbian EPI range on agriculture is better than the rank on the national level. Total air emissions of observed agriculture companies grew in 2011-2014 and again in 2021. Indicator values vary among analyzed agriculture companies, even in different years for the same company. Profitability measured by return on assets significant rise during the decrease of environmental efficiency implementing all applied regression panel analysis.

DISCUSSION / POLICY IMPLICATIONS

The Serbian agriculture sector is one of the key factors in the economic country's development. Air pollutants (ammonia, non-methane volatile organic compounds, suspended particles, nitrogen oxides, methane, and carbon monoxide) emitted by agriculture companies are dangerous to environmental quality. Assessment of how efficient companies are in terms of air emissions and revenues can help companies' management, policymakers, and other stakeholders to follow pollution trends, identify determinants of environmental efficiency, promote environmental efficiency, and improve environmental policies, especially emission reduction policies.

CONCLUSION

The EPI Serbian performance on agriculture is in decline in 2021. The environmental pressure measured by air pollutant emissions of 52 agricultural companies in Serbia weakened in 2015-2020. The research result shows the profitability improvement in 2011-2021 when the environmental pressure created by companies' production activities is reduced. The companies in three economic activities (Growing of cereals, except rice, leguminous crops, and oil seeds, Raising of poultry, and Raising of swine/pigs) prevail in analyzed companies group.

KEYWORDS

Environmental pressure, Air pollutants emission, Profitability, Serbian agriculture companies

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ENVIRONMENTAL PERFORMANCE, FINANCIAL DEVELOPMENT, SYSTEMIC RISK AND ECONOMIC UNCERTAINTY: WHAT ARE THE LINKAGES?

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INTRODUCTION

In this study, we aim to dissect relationships among four alternative indicators of environmental performance and three broad dimensions of socio-economic development, namely: financial development, financial stability and economic uncertainty. Our objective is to uncover directed linkages among these phenomena, using composite rather than granular measures to proxy all of them. Besides, we examine the relationships jointly, while previous studies consider bivariate or trivariate relationships.

METHODOLOGY

We collect a dataset for 56 countries for the period 2010-2020. In order to uncover linkages among the variables, we conduct our analysis by applying panel local projections (Jordá, 2005). The method applies to the whole sample and to the two sub-samples whose composition is based on the cluster analysis conditional on all the five composite indicators of environmental performance.

RESULTS

For the whole panel and both sub-panels, key composite measures of environmental performance are unidirectionally and positively driven by systemic risk. This finding suggests that an increase in systemic risk tends to improve countries' scores in terms of environmental performance. Such effect is likely to

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stem from the economic downturns often triggered by financial crises, i.e. the realization of systemic risk. Financial development is found to exert an adverse effect on environmental performance, while economic uncertainty has no relationship with it.

DISCUSSION & POLICY IMPLICATIONS

There is no room for straightforward and easy-to-implement policy recommendations based on the relationships among the composite measures of environmental performance, financial development, financial stability and economic uncertainty. Reducing systemic risk, promoting financial development do not undoubtedly entail better environmental performance. Meanwhile, by fostering environmental sustainability, countries are indeed likely to curb the build-up of systemic risk.

CONCLUSION

We find that the composite measures of environmental performance are not tightly connected with the aggregate indicators of financial development, systemic risk and economic uncertainty. Trivial policy recommendations, e.g. reducing systemic risk or spurring financial development do not appear to improve environmental performance in the panel data framework. Meanwhile, ex ante better environmental performance helps mitigate systemic risk.

KEYWORDS

Environmental performance, Systemic risk, Financial development, Economic uncertainty

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THE IMPACT OF FINANCIAL DEVELOPMENT ON ENVIRONMENT, SOCIAL, AND GOVERNANCE (ESG) PERFORMANCE: THE CASE OF MENA COUNTRIES

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INTRODUCTION

The MENA region has seen economic growth, transitioning to service-based economies. This has improved living standards but also posed ESG challenges. Financial development plays a key role in determining ESG performance. Research shows a link between financial development and ESG objectives, with better financial systems leading to higher ESG achievement. Different aspects of financial development have varied effects, overall exerting a positive influence on ESG performance.

LITERATURE REVIEW / THEORETICAL BACKGROUND

Financial development plays a vital role in promoting environmental performance by improving capital allocation, reducing transaction costs, and enhancing the stability of financial systems. Research indicates a complex relationship between financial development and environmental performance (Håkansson and Salu, 2021). While it can positively impact firms' access to financing for sustainable innovations (Ng et al., 2020; Saud et al., 2019), it can also worsen environmental degradation when coupled with weak institutions or driven by sectors with high environmental impacts (Ganda, 2019). Policymakers need to adopt a nuanced approach to ensure that financial development fosters sustainable development and environmental well-being.

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METHODOLOGY

This study relies on the panel data approach, offering advantages in terms of degrees of freedom and addressing omitted variables. However, spatial dependence in panel data poses challenges. Hence, the Hoechle's model is employed, providing POLS and FE estimates with Driscoll and Kraay's standard deviations. The Hausman test distinguishes between POLS and FE models. Similar techniques to recent research studies are implemented, including static models (POLS and FE) and dynamic models (GMM estimator). The static and dynamic panel models used are as follows:

$$ESG_{i,t} = \alpha + \beta FD_{i,t} + \gamma GDP_{i,t} + \delta TO_{i,t} + \varepsilon FDI_{i,t} + \mu_{it} \quad (1)$$

$$ESG_{i,t} = \alpha + \beta ESG_{i,t-1} + \gamma FD_{i,t} + \delta GDP_{i,t} + \theta TO_{i,t} + \varepsilon FDI_{i,t} + \mu_{it} \quad (2)$$

where for country *i* (the cross–sectional dimension) at time *t* (the time dimension), ESG is the ESG index scores for the *i*th country at the time *t*; α is the intercept; FD is the financial development index; GDP is GDP per capita, PPP (constant 2017 international $); TO is the sum of exports and imports as percentage of GDP; FDI is foreign direct investment, net inflows as percentage of GDP;[3] $ESG_{i,t-1}$ is the 1-year lagged value of the dependent variable and μ_{it} is the error term.

RESULTS

The study reveals that financial development (FD) in MENA countries has a significant negative effect on ESG scores, with a 1% increase leading to a 0.44% decrease in scores. These findings contrast with some previous studies but align partly with Håkansson and Salu's (2021) research. GDP growth positively influences ESG scores, while increased openness has a negative impact. Similarly, the development of financial markets (FM) negatively affects ESG scores, but the impact of financial institutions (FI) is insignificant. The GMM estimator confirms the consistent negative effects of FD and FM on ESG scores in the MENA region.

DISCUSSION / POLICY IMPLICATIONS

The study highlights the need for caution among MENA policymakers regarding the potential negative impact of financial growth on ESG performance. To counter this, governments should implement policies that encourage sustainable finance and ESG standards. Mandating ESG reporting and incentivizing sustainable investment

[3] $ESG_{i,t-1}$ is the 1-year lagged value of the dependent variable.

are examples of such policies. Investors should also consider the negative effects of financial development on ESG performance when making investment decisions in the region. By incorporating ESG metrics and engaging with companies, investors can contribute to long-term sustainability. Collaboration between policymakers and investors is crucial to promote sustainable finance and ESG practices while ensuring economic growth.

CONCLUSION

This research investigates the correlation between financial development and environmental, social, and governance (ESG) performance in 17 MENA countries from 2012 to 2020. The findings suggest that as financial development increases, ESG scores tend to decrease, particularly due to the growth of financial markets. However, the influence of banks on ESG ratings is not significant. The GMM technique confirms these results, but there is still debate regarding the impact of financial development on ESG. The study highlights the persistence of ESG ratings over time and no significant changes in the control variables.

KEYWORDS

Financial development, ESG performance, Middle East, North Africa, MENA

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ECONOMIC LOSS ASSESSMENT OF REGIONAL INDUSTRIAL CHAINS UNDER EXTREME CLIMATE RISK: BASED ON TORRENTIAL RAIN AND DROUGHT DISASTERS

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INTRODUCTION

In recent years, extreme weather has taken place around the world, and long-term climate change is considered to be the main driver. For example, China is one of the countries severely affected by natural disasters, especially in the past two years. It has experienced relatively severe extreme rainstorms, high temperature and drought events. In 2021, the direct economic losses caused by natural disasters in China will account for about 0.29% of the annual GDP, and the economic losses caused by climate change cannot be underestimated. Based on (Pendall et al., 2010), the climate risk external shocks faced by the regional economy can be divided into two categories: the first category is "slow burning", and the medium and long-term climate disasters belong to this category; the second category is "dramatic change", extreme natural disasters fall into this category. These two types of shocks have different targets and economic consequences (Pérez & Barreiro-Hurlé, 2009; Arto et al., 2015; Lenzen et al., 2019; Tan et al., 2019; Huang et al., 2022), and have different impacts on regional industrial linkages, resulting in differential changes in the resilience of regional industrial chains.

Therefore, this paper intends to identify the key industries in the industrial chain through the social network analysis method. From the perspective of industry supply and demand and key industries, based on the ARIO model, we assess the direct and indirect economic losses of industries and their industrial chains caused by two types of risk. Then we simulate the total economic changes caused by different losses in key industries through scenario analysis. Combining the industrial

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chain resilience evaluation indicators in the existing literature and the collation network indicators in the social network analysis, the industrial chain resilience evaluation system is constructed in this paper.

METHODOLOGY

Our research is based on three methods: Social network analysis (SNA), adaptive regional input-output (ARIO) model and quantification of resilience indicators. Social network analysis is used to identify key industries in two categories of climate risk. The social network analysis method is based on the network. The network construction data mainly comes from the input-output table data in the official website of CEADs. The input-output table data can be divided into the whole country and each province in the country. Social network analysis includes two categories of indicators: overall network indicators and individual network indicators. Three indicators of network density, average path length and clustering coefficient are proposed to be used in the overall network indicators. The individual network indicators are proposed to use the following indicators: degree centrality, betweenness centrality, closeness centrality, and eigenvector centrality. The ARIO model has been used by several scholars (Hallegatte, 2008; Hallegatte, 2014; Koks & Thissen, 2016; Galbusera & Giannopoulos, 2018; Kajitani & Tatano, 2018), and it is one of the most effective tools for simulating the short-term economic impact of disasters and post-disaster economic recovery. The ARIO model measures the indirect economic losses of key nodes (industries) and their industrial chains from two aspects: the supply shortage in the emergency period and the increase in demand in the reconstruction period, and analyzes the disaster losses under different scenarios, as well as the affected areas in the industrial chain. Finally, this paper intends to evaluate the resilience of regional industrial chains caused by disasters by constructing an industrial chain resilience evaluation index system. The specific indicators used include network indicators and resilience indexes. The secondary indicators included in the network indicators include the overall network indicators in social network analysis: network density, average path length and clustering coefficient. The secondary indicators included in the resilience index are recovery time and recovery degree.

RESULTS

The indirect economic losses caused by rainstorms, floods and droughts cannot be ignored. In particular, drought events are often persistent, and their indirect economic losses are of the same magnitude as those of rainstorms and floods. Both indirect economic losses exceed direct economic losses. The indirect losses caused

by inter-regional and inter-industry industrial linkages have had a huge impact on the local economic system. Agriculture is the most vulnerable industry in both storm and flood disasters and drought disasters.

CONCLUSION

The research results of this work could be used to analyze the indirect economic loss assessment of flood and drought disasters in China (or any similar region) through economic models. It can provide a reference for the study of other catastrophe cases. Due to the complexity of post-disaster reconstruction and the impact of reconstruction policies on indirect economic losses caused by disasters, the actual recovery and reconstruction is affected by various factors such as the local and external economic environment, labor supply, price levels, and long-term fiscal and financial policies.

KEYWORDS

Climate risk, Industrial chain resilience, Social network analysis, Adaptive regional input-output model, Quantification of resilience indicators

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CROWDFUNDING FOR CLIMATE CHANGE: A SYSTEMATIC LITERATURE REVIEW OF THE CROWDFUNDING PRACTICES TO FINANCE CLIMATE CHANGE MITIGATION

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INTRODUCTION

The escalating global awareness of climate change has ignited a discourse on alternative methods of financing climate mitigation initiatives. Among various options, crowdfunding has emerged as a particularly convenient alternative. Crowdfunding entails acquiring funds from a potentially extensive network of interested backers, each contributing a relatively modest sum of money, often bypassing traditional financial intermediaries. This approach presents a compelling opportunity for financing climate mitigation projects (Maehle et al., 2021a).

LITERATURE REVIEW / THEORETICAL BACKGROUND

Crowdfunding campaigns have successfully facilitated the implementation of diverse projects aimed at combating climate change, such as solar panels, community energy initiatives, biogas facilities, and community-supported micro dams. These campaigns have garnered support from citizens across the globe. Beyond providing financial returns to crowdfunding investors, these endeavors have actively contributed to the pursuit of environmental sustainability (Hörisch, 2019; Lam & Law, 2016; Kragt et al., 2021; Maehle et al., 2020; Maehle et al., 2021b; Testa et al., 2019).

METHODOLOGY

Numerous questions persist regarding the appropriate design, implementation, and feasibility of crowdfunding platforms, as well as the motivations and willingness of crowdfunding campaigns specifically focused on climate change. Additionally, it remains important to ascertain the extent to which public policies can bolster the success of such crowdfunding campaigns (Chervyakov & Rocholl,

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2019). To address these inquiries, this review adopts the "Systematic Literature Review" (SLR) approach originally introduced by Tranfield et al. (2003), employing objective and replicable procedures for literature synthesis.

RESULTS

This study endeavors to analyze the extent to which existing research literature addresses the challenges encountered by community-supported crowdfunding campaigns for climate change. It aims to identify factors that contribute to the success or failure of these campaigns and identify best practices.

POLICY IMPLICATIONS

The study aims at providing analysis to unlock the potential of crowdfunding as a catalyst for green transition. Investigation of the papers will also explore the best practices and successful implementation of sound policies towards equity based crowdfunding. Furthermore, this study aims to identify research gaps within the context of crowdfunding for climate change.

CONCLUSION

This study aims to conduct a systematic review of the literature at the intersection of crowdfunding and climate change. It intends to explore various aspects, including the types of crowdfunding campaigns (donation, equity, lending, or reward-based), the nature of the projects, and the factors that influence the success or failure of these campaigns.

KEYWORDS

Climate Change, Green Transition, Crowdfunding, Entrepreneurship

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